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INVITATION FOR BID
FOR
TURNKEY ENGINEERING AND CONSTRUCTION
FOR
GRESIK CEMENT PLANT EXPANSION
P. T. SEMEN GRESIK (PERSERO)
SURABAJA, EAST JAVA, INDONESIA

233p.

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Agency for International Development
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Washington, D. C.

Prepared by
THE RUST ENGINEERING COMPANY
A Division of Litton Industries
930 Fort Duquesne Boulevard
Pittsburgh, Pennsylvania 15222

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TABLE OF CONTENTS

	Section Page No.	Numerical Page No.
Table of Contents	TOC-1 thru -6	1
Introduction	I-1 thru -3	7
Invitation to Bidders	ITB-1	10
Instructions to Bidders	IFB-1 thru -5	11
1. Contract Documents	IFB-1	11
2. Date and Place for Receiving Proposals	IFB-1	11
3. Proposal Form	IFB-1	11
4. Acceptance or Rejection of Proposals	IFB-2	12
5. Time of Execution of Contract	IFB-2	12
6. Time for Beginning and Completing the Work	IFB-3	13
7. Site Visitation	IFB-3	13
8. Omissions and Discrepancies	IFB-3	13
9. Interpretations and Addenda	IFB-3	13
10. Source and Origin	IFB-4	14
11. Subcontracting	IFB-4	14
12. Cost Distribution	IFB-4	14
13. Suspended Firms	IFB-4	14
14. Bonds and Guaranty	IFB-4	14
Proposal Form	PF-1 thru -11	16
Contract	C-1 thru -6	27
Article I - Scope of Work	C-1	27
Article II - Time of Completion	C-2	28

	Section Page No.	Numerical Page No.
Contract Form (Cont'd.)		
Article III - Contractor's Compensation	C-2	28
Article IV - Payment	C-2	28
Article V - Source and Origin	C-3	29
Article VI - Definition of Costs	C-3	29
Article VII - Local Currency	C-4	30
Article VIII - Logistic Support	C-4	30
Article IX - Report of Delays	C-4	30
Article X - Assignment of Contract	C-5	31
Article XI - Condition Precedent	C-5	31
Article XII - Governmental Regulations	C-5	31
Article XIII - Civil Rights	C-5	31
Article XIV - Disputes	C-5	31
Article XV - No Other Agreements	C-6	32
Article XVI - General Agreement	C-6	32
General Conditions	GC-1 thru -44	33
1. General Note	GC-1	33
2. Correlation and Intent of Documents	GC-1	33
3. Definitions	GC-1	33
4. Definition of Costs	GC-4	36
5. Application of Source and Origin Rules to Procurement of Equipment and Materials	GC-8	40
6. Source and Origin	GC-13	45
7. Exemptions from U.S. Source and Origin Requirement	GC-13	45

		Section Page No.	Numerical Page No.
General Conditions (Cont'd.)			
8.	Material and Equipment Procurement	GC-14	46
9.	Schedule of Order of Completion	GC-14	46
10.	Drawings and Specifications on the Work	GC-15	47
11.	Contractor's Understanding	GC-15	47
12.	Permits, Licenses and Other Fees	GC-16	48
13.	Taxes	GC-16	48
14.	Governmental Regulations	GC-16	48
15.	Modification or Amendment	GC-16	48
16.	Changes	GC-17	49
17.	Contractor-USAID Relationship	GC-17	49
18.	Contractor's Employees	GC-18	50
19.	Insurance	GC-19	51
20.	Accounts, Records and Inspections	GC-23	55
21.	Examination of Records	GC-23	55
22.	Reports and Information	GC-24	56
23.	Subcontracts	GC-24	56
24.	Language, Weights and Measures	GC-25	57
25.	Notices	GC-25	57
26.	Covenant Against Contingent Fees	GC-25	57
27.	Default	GC-26	58
28.	Termination for Convenience of the Owner	GC-28	60
29.	Adjustment for Force Majeure	GC-33	65
30.	Diversion Rights	GC-34	66

	Section Page No.	Numerical Page No.
General Conditions (Cont'd.)		
31. Performance Guaranties	GC-34	66
32. Payment Guaranties	GC-35	67
33. Specific Risk Investment Guaranty	GC-36	68
34. Guarantee - Work Material and Production	GC-36	68
35. Start-up and Acceptance Tests	GC-37	69
36. Liquidated Damages	GC-38	70
37. Indemnity	GC-39	71
38. Liens	GC-39	71
39. Royalties and Patents	GC-40	72
40. Rights of Various Interests	GC-40	72
41. Waiver of Specified Terms by Purchaser	GC-40	72
42. Legal Effects of A.I.D. Approvals	GC-40	72
43. Correction of Work	GC-41	73
44. Use of Completed Portions	GC-41	73
45. Marking	GC-42	74
46. Protection of Work and Property	GC-43	75
47. Accident Prevention	GC-43	75
48. Cleaning Up	GC-44	76
49. Inspection of Works by A.I.D. and Owner	GC-44	76
50. Superintendence: Supervision	GC-44	76
Special Conditions	SC-1 thru -10	77
1. Site Visitation	SC-1	77
2. Surveys, Lines and Grades	SC-1	77
3. Verification of Dimensions	SC-1	77

	Section Page No.	Numerical Page No.
Special Conditions (Cont'd.)		
4. Temporary Facilities at Job Site	SC-2	78
5. Facilities or Services Provided by Owner	SC-2	78
6. Office Space for Owner's Representative	SC-3	79
7. Railroad Siding and Dock	SC-4	80
8. Existing Plant Operation	SC-4	80
9. Disposal	SC-4	80
10. Use of Premises	SC-4	80
11. Project Signs	SC-4	80
12. Standards	SC-5	81
13. Drawings, Specifications, Manuals, and Spare Parts Lists	SC-5	81
14. Consultant's Participation	SC-7	83
15. Disposal of Construction Equipment and Materials	SC-8	84
16. Construction Labor	SC-8	84
17. Procedure Manual	SC-8	84
18. Receiving, Unloading, Checking, and Storing of Equipment	SC-9	85
19. Overseas Packing	SC-10	86
20. Shop Inspection	SC-10	86
Technical Section		
Specifications:		
Section 1 - Description of Work	TS1-1 thru -10	87
Section 2 - Work by Owner	TS2-1	97

	Section Page No.	Numerical Page No.
Specifications: (Cont'd.)		
Section 3 - Site Work	TS3-1 thru -2	98
Section 4 - Architectural	TS4-1 thru -7	100
Section 5 - Structural	TS5-1 thru -11	107
Section 6 - Piping	TS6-1 thru -29	118
Section 7 - Electrical	TS7-1 thru -13	147
Section 8 - Control	TS8-1 thru -7	160
Section 9 - Equipment	TS9-1 thru -47	167
Section 10 - List of Existing Equipment	TS10-1 thru -10	214

Drawings:

0592-M100 - Plot Plan
0592-M101 - Flow Diagram, Rotary Kiln System #4
0592-M102 - Flow Diagram, Finish Mill #8
0592-M103 - Slurry Viscosity Curves
0592-M104 - Plant Air Compressor Bldg.
0592-M105 - #4 Rotary Kiln Feed End
0592-M106 - #4 Rotary Kiln Cooler & Burner End
0592-M107 - Finish Mill #8
0592-M108 - Storage Bldg. Crane Clearance Diagram

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

INTRODUCTION

The work, as covered by these documents, consists of the expansion of the existing 375,000 M.T. per year P. T. Semen Gresik (Persero) Plant located at Gresik, East Java, Indonesia, to a capacity of 500,000 M.T. per year.

The initial two-kiln plant with a nominal capacity of 250,000 M.T. per year of Type I cement was placed in operation in 1957. The plant was expanded by the addition of a third kiln to a nominal capacity of 375,000 M.T. per year in 1961. During this expansion, space and some provision in the layout was made for the future fourth kiln necessary for increasing the production to 500,000 M.T. per year.

The engineering and construction of the original plant and the previous expansion were done by American firms financed partly by the Indonesian Government and a loan from the Export-Import Bank. The current expansion is to be financed by P. T. Semen Gresik (Persero) and under A.I.D. Loan 497-H-018. The participating firm or firms of United States origin will be paid in U.S. currency with local labor and logistic support being furnished by Semen Gresik or paid in Indonesian rupiah. The breakdown of the Indonesian rupiah costs and U.S. dollar costs are defined in the General Conditions.

All equipment and the bulk of construction materials such as structural steel, reinforcing steel, pipe, conduit, wire, siding, etc. utilized in the construction are of United States origin. The drawings for the project utilized the English system and metric systems.

The plant is located in the town of Gresik, which is located along the northeast coast of East Java on the Straits of Madura, approximately 15 miles west of the seaport of Surabaja. The plant has its own dock which can accommodate ocean going vessels and can be used to receive equipment and material for use on this project.

Prior to 1969, the company was owned and operated by a non-budget supported state's enterprise which was under the jurisdiction of the Directorate General of Chemical Industries and denoted as such by the prefix P.N. before its name (P. N. Semen Gresik). In 1969, the company was made an autonomous stock corporation in which the stock is held by the government but is available for sale to private individuals and denoted as such with the prefix P. T. and suffix (Persero) [P. T. Semen Gresik (Persero)].

General Information on Java

Of the approximate 2,000 islands which comprise the Republic of Indonesia, Java is fourth in area with 48,504 square miles and is inhabitated by 63 million of Indonesia's total 97 million people. Java lies just south of the equator between the Malay Peninsula and Australia. The island is approximately 600 miles long and 100 miles wide with its long axis in an east-west direction.

A chain of mountains runs from west to east. The mountains are flanked on the north by lowlands and on the south by limestone ridges. Java's highest mountain is 12,060 ft. Other mountains are 11,400 ft., 9,255 ft. and 5,730 ft.

Java is highly volcanic with 15 of 112 volcanic centers being active. The Tanghuban Pran Papandajan, Merapi, Kelat, Senern and Idjen are under constant observation. The Bromo, about 7,800 feet high, is always steaming and rises from a huge crater bed of sand in the Tengger highlands. The Idjen plateau, which covers 82 square miles, is one of the largest extinct craters. None of these are located in the immediate vicinity of the plant site.

Most rivers in Java run northward. The Solo and Brantas are the largest in the eastern part of Java and the Tjitarum and Tjimanuk are the most important in western Java. Most rivers are navigable by small boats in the wet season only. The primary use of the rivers is for irrigation.

In spite of the subequatorial situation, Java rarely has extreme heat. The temperature averages 78 to 80 degrees Fahrenheit primarily due to the sea breezes which relieve the heat. The highest temperature is experienced in the plains along the north coast where the temperatures range from a

maximum of 96.4 to a minimum of 66 degrees. In the mountains above 2,000 feet the temperatures are very temperate, but temperatures of 27 degrees have been recorded on the heights.

High humidity is the general rule throughout the island. The humidity ranges between 78 to 88 per cent.

Rainfall throughout Java varies and ranges from 166 inches to 35 inches with the eastern part of Java being one of the dryer areas. Java has a northwest monsoon from December to March which brings much rain with January being the wettest month.

Administratively, Java is divided into three Provinces; East Java with capital at Surabaja, Central Java with capital at Semarang, and West Java with capital at Bandung. Each province is further divided into regencies, districts, subdistricts and villages. Each province has a status as an autonomous territory. The federal capital of Indonesia is located in Djakarta which is located in West Java.

Java is one of the most densely populated areas in the world with about 1,000 people per square mile. The majority of the population lives in rural communites, but there are several large cities such as Djakarta with a population of 4 million and Surabaja with a population of 1 million.

The religion of Java is predominately Moslem.

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

INVITATION TO BIDDERS

Gentlemen:

You are invited to submit a proposal for turnkey engineering and general construction of the expansion of the P. T. Semen Gresik (Persero) plant located at Gresik, East Java, Indonesia, from the present 375,000 M.T. per year capacity to 500,000 M.T. per year.

The proposal and other data submitted by bidders will form the basis for execution of a contract for the work. The contract for the work, as covered by these documents, upon the approval of A.I.D. shall be executed between P. T. Semen Gresik (Persero) and the successful bidder. Terms of the contract shall be in accordance to A.I.D. Capital Projects Guidelines M.O. 1441.2 - TL13:271, dated January 1969, covering Borrower Procurement of Construction Services of the United States Source and Origin. Proposals are to be submitted in the proper form as described in the "Instructions to Bidders." They shall reach the designated office on June 29, 1970, not later than 2:00 p.m. E. DL. T.

All bidders must inspect the site. A representative of The Rust Engineering Company and representative of the Owner will be present at the job site on April 20, 1970. All bidders are to provide for their own transportation to and from Surabaja, East Java. Once at Surabaja, ground transportation, food, and lodging will be provided by Semen Gresik. Food and lodging accommodations shall be at the Semen Gresik guest house. All bidders are to advise E. F. Svetec, c/o The Rust Engineering Company, as to the number of people each bidder will have attend the site visitation.

Your attention in particular is invited to the "Instruction for Bidders," which is to be followed in all respects.

FOR P. T. SEMEN GRESIK (PERSERO)

THE RUST ENGINEERING COMPANY

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

INSTRUCTIONS FOR BIDDERS

1. Contract Documents

The contract documents consist of all the document sections of the "Invitation for Bid" (I.F.B.) listed in the Table of Contents, including all modifications thereof incorporated into the documents before their execution. These form the contract. Bidders must examine each of the contract documents and inform themselves of all the conditions and make their own estimate of the facilities and difficulties attending the execution of the work.

The general description of the work is covered in Technical Section TS-1 and is defined in its entirety by these contract documents.

2. Date and Place for Receiving Proposals

Pursuant to the "Invitation to Bidders," proposals for performing the work will be received in the name of P. T. Semen Gresik (Persero) by The Rust Engineering Company, 930 Fort Duquesne Boulevard, Pittsburgh, Pennsylvania 15222, Attention: Mr. E. F. Svetec.

Sealed proposals will be opened and read publically at 2:30 p.m. on June 29, 1970, at the offices of The Rust Engineering Company.

3. Proposal Form

All proposals must be made in the form of proposal included in these contract documents.

Proposals are to be submitted in four complete, signed copies. No oral, telephonic, or telegraphic proposals or modifications will be considered

4. Acceptance or Rejection of Proposals

It is the intent that the contract be awarded to the qualified and responsive bidder on the basis of lowest fixed U.S. dollar price. The Owner, subject to A.I.D. approval, shall reject any fixed U.S. dollar price bid that is unresponsive and may reject any or all bids after bid tabulation, analysis, and evaluation which is not submitted in accordance with the requirements of these documents, which is incomplete or obscure, or in which the quantities and prices for the cost reimbursable Rupiah portions of the work may be irregular and indicate that the estimated cost reimbursable price is unrealistic or unreliable. The Owner may also reject any fixed U.S. dollar bid which it deems excessive.

The acceptance of a proposal will be a notice in writing signed by a duly authorized representative of the Owner. No such notice shall be made until after A.I.D. approval. The successful bidder shall sign the contract as included in the contract documents. The rights and obligations provided for in the contract shall become effective and binding upon A.I.D. approval of the contract executed between the Owner and the successful bidder.

A responsive bid is one which accepts all of the terms and conditions of the I.F.B. without material modification. A material modification is one which affects in any way the price, quantity, quality or delivery or installation date of equipment or material; or, the price, quality, scope, or completion date of construction or other services to be supplied or performed; or which limits in any way any responsibilities, duties, or liabilities of the bidder or any rights of the Owner or of A.I.D. as any of the foregoing have been specified or defined in the contract documents. The Owner may waive any minor informality in a bid which does not constitute a material modification.

5. Time of Execution of Contract

Upon notice of acceptance of proposal, the successful bidder shall execute the enclosed contract with the Owner. Owner will have his representative in the United States for execution of contract. The site is not definite but will probably be Pittsburgh, Pennsylvania, or Washington, D. C.

At the time of execution of contract, the Owner and successful bidder shall, in accordance with the "Special Conditions," establish procedures for the administration of the project including scheduling, construction procedure, inspection, reporting, cost control of the reimbursable portion of contract, and any other details which may be pertinent to the proper administration of the contract.

6. Time for Beginning and Completing the Work

The Contractor shall commence work immediately upon establishment of an irrevocable letter of credit in accordance with Article XI - Conditions Precedent of the Contract Form - and complete all work within 550 calendar days therefrom.

7. Site Visitation

Bidders must examine each of the contract documents included in the I.F.B. and must visit the location of the work and inform themselves of the conditions and make their own estimate of the facilities and difficulties attending the execution of the work prior to submitting their proposals.

A representative of The Rust Engineering Company and representatives of the Owner will be present at the site at the time set forth in the "Invitation to Bidders."

The work under this contract calls for the rehabilitation or rebuilding of one (1) existing diesel generator. Data of the magnitude of the rebuild work must be established at the site visitation.

8. Omissions and Discrepancies

Should a bidder find discrepancies in or omissions from the drawings or contract documents, he should at once notify in writing the Owner's representative in accordance with paragraph 9.

9. Interpretations and Addenda

No oral interpretation shall be made to any bidder as to the meaning of the contract documents or be effective to

modify any of the provisions of the contract documents. Every request for an interpretation shall be made in writing and addressed and forwarded to P. T. Semen Gresik (Persero), c/o The Rust Engineering Company, 930 Fort Duquesne Boulevard, Pittsburgh, Pennsylvania 15222, Attention: Mr. E. F. Svetec.

A written interpretation or addenda shall be issued to all bidders.

10. Source of Origin

All goods and services shall be of source and origin as defined in the "General Conditions."

11. Subcontracting

Subcontracting is defined in the "General Conditions."

Under the cost reimbursable Rupiah portion of the work, the Contractor may and is encouraged to utilize local subcontractors wherever possible.

12. Cost Distribution

The distribution between the fixed U.S. dollar price and cost reimbursable Rupiah price is defined in the "General Conditions."

13. Suspended Firms

No firm included on the list of suspended, debarred, or ineligible bidders maintained by A.I.D. will be eligible to participate in any portion of the work under this I.F.B.

14. Bonds and Guaranty

A. Bid Bond

The Contractor shall furnish with his proposal a Bid Bond in the amount of 10 per cent of the total amount of the fixed U.S. dollar portion of the work.

B. Performance and Payment Guaranties

Performance and payment guaranties, as defined in the "General Conditions," will be required prior to the execution of contract.

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

PROPOSAL FORM

P. T. Semen Gresik
c/o The Rust Engineering Company
930 Fort Duquesne Boulevard
Pittsburgh, Pennsylvania 15222

Attention: Mr. E. F. Svetec

Gentlemen:

Proposal of _____
Name

_____
Address

We have visited the site of the work and examined the Contract Documents describing the proposed work and titled: Gresik Cement Plant Expansion for P. T. Semen Gresik (Persero), Surabaja, East Java, Indonesia, dated March 23, 1970, consisting of a "Table of Contents;" "Introduction;" "Invitation to Bidders;" "Instruction for Bidders;" "Proposal Form;" "Technical Section" containing design criteria, specifications and drawings; and the following "Addenda" thereto (Bidder to list Addenda, if any, otherwise state "None"):

_____

_____

_____;

and we propose to completely accomplish that portion of work defined as the fixed U.S. dollar price portion of the work in accordance with said Contract Documents for a lump sum price of _____
(words)

(_____).
(figures)

We estimate the price of the cost reimbursable Rupiah portions of the work to be _____
(words)

_____ (_____).
(figures)

The fixed U.S. dollar price portion of the work and estimated cost reimbursable Rupiah portions of the work include the following amounts for the items listed below. The Owner reserves the right to delete from the scope of the work at the prices indicated any or all of the listed items prior to execution of contract.

1. All work in Area "D" - Storage Building:

   a. Fixed U.S. dollar price _____
   b. Cost reimbursable Rupiah price _____

2. In Area "E" - Mill Area - for all work in conjunction with paragraph 1.1.5.2 of Technical Section covering the conversion of four wet grinding mills from open to closed circuit:

   a. Fixed U.S. dollar price _____
   b. Cost reimbursable Rupiah price _____

3. In Area "G" - Kiln Feed Building - for all work in conjunction with paragraph 1.1.7.11 of Technical Section 1, covering the modification of the dust return system:

   a. Fixed U.S. dollar price _____
   b. Cost reimbursable Rupiah price _____

4. In Area "H" - Kiln - for all work in connection with modifying the fuel oil heating system on the existing three kilns from the present system to heat exchanger system:

   a. Fixed U.S. dollar price _____
   b. Cost reimbursable Rupiah price _____

5. In Area "J" - Cooler and Burner Building - all work in conjunction to paragraph 1.1.7.7 pertaining to centralized lubrication system for all four coolers:

6. All work in Area "K" - Packhouse and Cement Storage:

   a. Fixed U.S. dollar price _____
   b. Cost reimbursable Rupiah price _____

7. In Area "M" - Power Plant - all work in conjunction with paragraphs 1.1.10.2 through .4 in conjunction with the new compressor house and relocation of existing compressors:

   a. Fixed U.S. dollar price _____
   b. Cost reimbursable Rupiah price _____

8. In Area "N" - Fuel & Diesel Oil Storage - all work in conjunction with paragraph 1.1.11.2 of Technical Section 1, covering the two new pumps at the tank farm:

   a. Fixed U.S. dollar price _____
   b. Cost reimbursable Rupiah price _____

9. All work in Area "P" - Laboratory and Office:

   a. Fixed U.S. dollar price _____
   b. Cost reimbursable Rupiah price _____

10. In Area "Y" - Yard and Quarry - all work in conjunction with paragraph 1.1.17.1 of Technical Section 1, covering the relocation of Substation No. 2:

    a. Fixed U.S. dollar price _____
    b. Cost reimbursable Rupiah price _____

11. In Area "Y" - Yard and Quarry - all work in conjunction with paragraph 1.1.17.2 of Technical Section 1, covering the replacement of the existing 2,400 volt cable:

    a. Fixed U.S. dollar price _____
    b. Cost reimbursable Rupiah price _____

This proposal recognizes the right of P. T. Semen Gresik (Persero), upon approval of A.I.D., to reject any or all bids for the work described in the contract documents and accepts the right of P. T. Semen Gresik (Persero) to award, with the approval of A.I.D., a contract to lowest responsive bidder in accordance with paragraph 4 of the "Instructions for Bidders."

It is understood that, as a condition of this proposal, no contract, oral or otherwise, will exist until a written agreement has been signed by an officer of P. T. Semen Gresik (Persero). Any expense incurred by the bidder prior to the execution of such contract will be borne exclusively by the bidder, without any obligation of any kind on the part of

P. T. Semen Gresik (Persero) or A.I.D. regardless of the circumstances under which such expense was incurred.

The following data is submitted to aid the Owner in establishing the responsiveness of the proposal.

1. The basis of the estimate of the cost reimbursable portion of the work is as outlined below:

	Quantity	Unit Price	Total Price (Rupiah)
Excavation (Machine)	___ cu. yd.	___ Rupiah	_____
Excavation (Hand)	___ cu. yd.	___ Rupiah	_____
Disposal	___ cu. yd.	___ Rupiah	_____
Backfill	___ cu. yd.	___ Rupiah	_____
Forms (include stripping in cost)	___ sq. yd.	___ Rupiah	_____
Concrete	___ cu. ft.	___ Rupiah	_____
Rebar (Placement)	___ tons	___ Rupiah	_____
Structural Steel (Erection)	___ tons	___ Rupiah	_____
Miscellaneous Metal (Placement)	___ tons	___ Rupiah	_____
Siding (Installation)	___ sq. ft.	___ Rupiah	_____
Roofing (Installation	___ sq. ft.	___ Rupiah	_____
Piping (Installation)			_____
Electrical (Installation)			_____
Mechanical (Installation)			_____
Administrative (Watchman, time keepers, clerks, accountants, etc.)			_____

	Quantity	Unit Price	Total Price (Rupiah)
Job Expense (Storage facilities, office supplies, local equipment rental, etc.)			
Transportation Cost			_____
Insurance			_____
_____			_____
_____			_____
			_____
TOTAL ESTIMATED RUPIAH COST			_____

2. Under the cost reimbursable Rupiah portion of the work, we propose to rent in accordance to all source and origin requirements the following items of construction equipment and material:

_____
_____
_____
_____
_____
_____
_____
_____

3. Under the fixed U.S. dollar portion of the work, we propose to ship to the job site the following items of Contractor owned construction equipment and material which, at the completion of work, will be shipped from Indonesia or disposed of in accordance to requirements of the "Special Conditions." Rental equipment and material shipped into Indonesia shall be treated the same as Contractor owned equipment and material.

_____
_____
_____
_____
_____

_____
_____
_____
_____
_____

4. Under the fixed U.S. dollar portion of the work, we propose to staff the job site with the following U.S. supervisory or administrative personnel. (List duties if not evident by title.) NOTE: Third party nationals, in accordance with paragraph 3 of the "General Conditions," may be utilized.

Title	Duties	Duration of Stay

5. Under the fixed U.S. dollar portion of the work, we propose to furnish at the job site the services of the following equipment supplier erection and/or service personnel.

Equipment Supplier	Duration of Stay

6. The soils investigation and report is included under the _____ portion of the work.

7. The unit U.S. dollar price for additional rebar necessitated as a result of the soil exploration delivered to the job site is _____ per ton.

8. The fixed U.S. dollar portion of the work is based on providing the following specific make of equipment.

a. Kiln:

(1) Manufacturer - _____

(2) Diameter - _____

(3) Length - _____

(4) Motor H.P. - _____

(5) Auxiliary Drive Mfgr. - _____

(6) Number of Piers - _____

b. Grate Type Cooler:

(1) Manufacturer - _____

(2) Size or Model No. - _____

(3) Motor H.P. - _____

c. Finish Ball Mill:

(1) Manufacturer - _____

(2) Diameter - _____

(3) Length - _____

(4) Motor H.P. - _____

d. Slurry and Clay Pumps:

Manufacturer - _____

e. Slurry and Clay Agitators: (all agitators to be same make)

Manufacturer - _____

f. **Bridge Cranes:**

(1) Crane Manufacturer - _____

Hoist Motors H.P. - _____

Trolley Motor H.P. - _____

Bridge Motor H.P. - _____

(2) Crane Bucket Manufacturer - _____

Weight of Bucket - _____

Rounded Load (cu. ft.) - _____

g. **Gypsum Feeder:**

(1) Manufacturer - _____

(2) Type - _____

h. **Clinker Feeder:**

(1) Manufacturer - _____

(2) Type - _____

i. Air Separator

(1) Manufacturer - _____

(2) Size - _____

j. **Bag Type Dust Collector:**

(1) Manufacturer - _____

(2) Volume (CFM) - _____

(3) Efficiency Rating - _____

k. **Belt Conveyors:**

Manufacturer - _____

l. Bucket Elevator:

Manufacturer - _____

m. Screw Conveyors:

Manufacturer - _____

n. Pre-Cleaner Cyclone:

Manufacturer - _____

o. Air Slide System:

Manufacturer - _____

p. DSM Screen:

Manufacturer - _____

q. Multiclone Dust Collector:

(1) Manufacturer - _____

(2) Volume (CFM) - _____

(3) Efficiency Rating - _____

r. I.D. Fan:

(1) Manufacturer - _____

(2) Volume - _____

(3) S. P. - _____

s. Dust Slurry Agitator:

(1) Manufacturer - _____

(2) Model & Size - _____

t. Primary Air Blower:

Manufacturer - _____

u. Kiln Seal Cooling Blower:

Manufacturer - _____

v. Kiln Fuel Oil Pumping System:

Manufacturer - _____

w. Cooler Fan:

(1) Manufacturer - _____

(2) Volume - _____

x. Plant Air Compressor:

Manufacturer - _____

y. Clay Hauling Trucks:

Manufacturer - _____

z. Track Mounted Crane:

Manufacturer - _____

aa. Fuel Oil Transfer Pumps:

(1) Manufacturer - _____

(2) GPM - _____

(3) Head - _____

ab. Telephone Exchange:

Manufacturer - _____

ac. Refractories:

Manufacturer - _____

9. The attached Bid Bond is hereby made a part of this Proposal Form.

It is the bidders understanding that the award of contract will be made in accordance with provisions of paragraph 4 of the "Instructions for Bidders."

It is the bidders intention, if awarded the contract, to comply fully and in all respects with the contract documents. (If not, the bidder shall state exception in detail. If no exception, state "None.")

Date: _____

Signature of Bidder: _____

Title: _____

Bid Bond

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

CONTRACT

_____

OF

_____

hereinafter termed the "Contractor," agrees to perform for

P. T. SEMEN GRESIK (PERSERO)

OF

SURABAJA, EAST JAVA, INDONESIA

hereinafter termed "Owner," the work outlined under "Scope of Work" in accordance with the terms and conditions hereinafter set forth.

Article I - Scope of Work

Furnish engineering and construction services, including all labor and equipment, and perform all the work for turnkey engineering and construction, as outlined herein, for the cement plant expansion, as defined in the "Invitation for Bid," at the Owner's plant located at Gresik, East Java, Indonesia.

The Contract Documents are complimentary and consist of the following:

1. Table of Contents
2. Invitation to Bidders
3. Instructions for Bidders
4. Proposal Form

5. Contract Form

6. General Conditions

7. Special Conditions

8. Technical Section, including drawings and specifications

The Contract Documents are as fully a part of the contract as if hereto attached or herein repeated.

The Documents described above contain the entire agreement between the parties hereto and shall not be modified in any manner, except by an instrument in writing signed by the respective parties and approved by A.I.D.

Article II - Time of Completion

The work to be performed under this contract shall be commenced upon receipt of irrevocable letter of credit, as defined in Article XI, and shall be completed 550 calendar days thereafter.

Article III - Contractor's Compensation

For performing the work for the fixed cost U.S. dollar portion of the work, including the fee for the cost reimbursable Rupiah portion of the work, as defined in the Contract Documents, the Contractor shall be paid a lump sum of (_____)
(figures)

_____.
(words)

The Contractor shall be paid for the cost reimbursable Rupiah portion of the work, as covered under Article IV.

Article IV - Payment

A. Fixed U.S. Dollar Portion of Contract:

Payment of the fixed U.S. dollar portion of the work shall be in U.S. dollars by irrevocable letter of credit through a U.S. bank upon presentation of Contractor's invoice and

documentation and certificates as required by A.I.D. as set forth in A.I.D. Capital Projects Guidelines M.O. 1441.2 TL13:271, dated January, 1969. The documentation will be detailed in the Procedure Manual in accordance to paragraph 17 of the "Special Conditions."

Progress payments shall be made monthly. During the first seven days of each calendar month, the Contractor shall submit to the Owner the necessary documentation for approval.

In accordance with paragraph 34 of the "General Condition," 10 per cent of the U.S. dollar portion of the contract shall be retained until completion of tests and acceptance by the Owner.

B. Cost Reimbursable Rupiah Portion of Contract:

Payment of the cost reimbursable Rupiah portion of the work shall be paid monthly in Indonesian Rupiah by the Owner through a local bank upon presentation of invoice and other documents through a procedure mutually agreed upon by the Contractor and Owner and approved by A.I.D.

Payment shall be from a revolving fund established by the Owner at the above bank in accordance with the loan agreement, which requires a reserve of approximately 20 per cent of estimated remaining cost of the project.

Article V - Source and Origin

All goods and services, unless specifically exempt, are to be of United States source and origin in accordance to the terms of the "General Conditions."

Article VI - Definition of Costs

The contract consists of two parts, a fixed cost U.S. dollar part and a cost reimbursable Rupiah part, as defined in the "General Conditions."

Article VII - Local Currency

The local costs of the contract shall not be reimbursed or paid to the Contractor from A.I.D. loan in U.S. dollars but shall be met in local currency by the Owner.

Whenever it is necessary for the Contractor or his employees to convert U.S. dollars to local currency, such conversion shall be made through arrangements with the U.S. Disbursing Officer, American Embassy, or the U.S.A.I.D. Controller.

Article VIII - Logistic Support

The following logistic support will be furnished by the Owner in kind in a timely fashion so as not to delay the work to the extent considered necessary for the performance of work under this contract to the Contractor or in the absence of furnishing said items to Contractor, the latter shall be reimbursed by the Owner.

1. Housing for Contractor's U.S. personnel in residence at the job site

2. Cement

3. Concrete Aggregates

4. Lumber (excluding plywood or other manufactured board)

5. Nails

6. Construction electric, power, water, compressed air

Article IX - Report of Delays

The Contractor shall report promptly to the Owner the occurence of any event or condition that might delay or prevent completion of the project in accordance with approved schedules and to indicate steps taken to correct these delays.

Article X - Assignment of Contract

Owner and Contractor agree not to assign, transfer, convey or otherwise dispose of this contract or the entire work provided for hereunder, or any of their right, title, or interest herein, to any person without the prior written consent of the other part and A.I.D.

Article XI - Condition Precedent

There shall be no duty of Contractor to proceed with the work as set forth in Article I, "Scope of Work," until such time as it receives from the Owner an irrevocable letter of credit at a U.S. banking institution in accordance with Article IV - Payment.

Article XII - Governmental Regulations

Contractor's obligations under this contract are subject to all Republic of Indonesia Governmental practices, restrictions, orders, or laws now or hereafter in force.

Article XIII - Civil Rights

Contractor agrees to comply with all U.S. and Indonesian local, state, and federal laws and ordinances regarding discrimination in employment against any individual on the basis of race, color, religion, sex or national origin. Contractor agrees to comply with all provisions of Title VII of the Civil Rights Act of 1964, as amended, and Executive Orders 1141 and 11246 as amended from time to time.

Article XIV - Disputes

Whenever any dispute arises under this contract, such dispute shall first be discussed between the Contractor and the Owner's designated representative. If they cannot resolve the dispute, it will then be submitted to executive representative of the Contractor and a representative of the Owner for settlement. Such representative will be appointed by each of the parties hereto when so requested in writing by the other party. The representatives shall meet within fourteen (14) days of the date of the letter requesting such meeting. If the representatives resolve the dispute and reach

agreement, such agreement is binding on both sides. If the representatives cannot resolve the dispute within 30 days, reach some other mutual agreement, or if one party fails to designate representative or to agree to a date of meeting between the representatives within 30 days, then either party may request in writing that the dispute be submitted to arbitration. The arbitration shall be held in Tokyo under the rules of the International Chamber of Commerce in effect at the time the request for arbitration was made. The arbitrators shall decide any question ex sequo et bone. The decision of the arbitrators shall be final and binding to the parties hereto.

Article XV - No Other Agreements

All negotiations, proposals, and agreements prior to the date of this contract are merged herein and superseded hereby, there being no agreements, warranties or understandings other than those written or specified herein unless otherwise specifically provided.

Article XVI - General Agreement

The parties hereby agree to be bound by all of the provisions of the contract documents as defined in Article I.

By: _____
P. T. Semen Gresik (Persero)

Title: _____

Date: _____

By: _____
Contractor

Title: _____

Date: _____

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

GENERAL CONDITIONS

1. General Note

These general conditions shall apply to the work as a whole and to each and all branches of the work. No arrangements or contracts between the Contractor and Subcontractor or suppliers are to be such as to conflict with any provisions herein. They shall also apply to any modifications or extra work.

2. Correlation and Intent of Documents

The Contract Documents are complementary and what is called for by one shall be as binding as if called for by all. The intention of the documents is to provide for all labor, materials, equipment, and transportation necessary for the proper execution of the work resulting in a complete and proper, usable and operating installation. The workmanship shall be of the best quality consistent with the materials and construction methods. Materials or work described in words which so applied have a well-known technical or trade meaning shall be held to refer to such recognized standards.

3. Definitions

As used throughout this Contract, the following items shall have the meaning as set forth below:

a. The term "Contract Documents" consists of all the document sections of the Invitation for Bids (IFB) and includes the Table of Contents, Invitation to Bid, Instructions to Bidders, Proposal Form, Contract Form, the General Conditions, the Special Conditions, the Technical Section, consisting of drawings and specifications, and all modifications thereof incorporated into the documents before the execution of the contract.

b. The term "Owner," "Beneficiary," or "Gresik" means P. T. Semen Gresik (Persero) of Surabaja, East Java, Indonesia.

c. The term "Contractor" means the firm or joint venture bidding the work or awarded the contract for the work.

d. The term "Contractor's U.S. Personnel" means the Contractor's personnel covered by the United States source and origin requirement for whom the Contractor will be paid in U.S. dollars as part of the fixed U.S. dollar portion of the work.

e. The term "Contractor's Indigenous Personnel" or "Contractor's Local Personnel" means the Contractor's personnel or the personnel of Subcontractor for whom the Contractor will be paid in Rupiah as part of the cost reimbursable Rupiah portion of the work.

f. The term "Consultant" means The Rust Engineering Company of Pittsburgh, Pennsylvania.

g. The terms "Cooperating County," "Borrower," "Local" or "Local Source" means the country or region receiving assistance from the United States and in which services are to be rendered under the contract.

h. The term "U.S.A.I.D." means the A.I.D. mission to, or principal A.I.D. office in, the Cooperating County.

i. The term "U.S.A.I.D. Director" means the Director of U.S.A.I.D., the Deputy Director of the U.S.A.I.D. or a person duly authorized to perform the functions of the Director or Deputy Director of the U.S.A.I.D.

j. The term "authorized by A.I.D.," "A.I.D. approval," "approval of A.I.D.," and similar terms means approval by U.S.A.I.D. or A.I.D./Washington, as appropriate and as may be specified in the IFB.

k. The term "Subcontractor" refers to an individual or firm having a direct contract with the Contractor and includes one who furnishes material worked to a special design according to the plans and specifications of this work. Under this contract, the term "Subcontract" includes purchase orders.

l. The term "Work" includes labor or material or both, supervision, equipment, transportation, or other facilities necessary to complete the contract.

m. "Fixed U.S. dollar price" portion of the work is that work for which the Contractor shall be reimbursed in U.S. dollars on a "fixed price" or "lump sum" basis. The fixed U.S. dollar portion of the work is defined in paragraph 4.A.

n. "Cost Reimbursable Rupiah Price" portion of the work is that work for which the Contractor shall be reimbursed in Rupiah on a cost reimbursable basis. The cost reimbursable rupiah price portion of the work is defined in paragraph 4.b.

o. Source and Origin:

(1) For construction services, the source and origin of the service means:

(a) For an individual, the country of citzenship or permanent residence (substantially uninterrupted physical presence for three consecutive years) of such individual.

(b) For a firm, the nationality of the firm.

(2) United States Firm:

An entity is a "U.S. Firm" if it meets the following conditions.

(a) It is incorporated or legally organized in the United States.

(b) It has its principal place of business in the United States.

(c) It is more than 50 per cent beneficially owned by a U.S. firm or firms and/or by United States citizens.

(3) Third Party Firms or National:

Not less than eighty per cent (80%) of all persons who perform services under the contract at the site of construction, whether employed directly by the Contractor or by a Subcontractor shall, at any time, be citizens of the United States, excluding from this computation, however: (i) citizens of (borrower country) as determined under the law thereof; and (ii) individuals who have been physically present in (borrower country) substantially uninterrupted for a period immediately preceding the date of any determination hereunder, of not less than three consecutive years. The Contractor agrees that his bid shall constitute a continuing undertaking to borrower, in consideration of the contract:

(a) To furnish Owner or A.I.D., upon Owner's request, any and all information pertaining to the above contract term; and

(b) To pay to Owner if United States citizens shall at any time comprise less than 80% of all persons employed in the project (as determined above) an amount equal to 15% of the total cost of all labor employed for work at the site of construction for the period during which such deficiency occurred.

4. <u>Definition of Costs</u>

a. Fixed U.S. Dollar Price:

The fixed U.S. dollar price or lump sum portion of the work shall include the following. All costs under the U.S. source and origin requirement fall under this category. Costs under this category are firm and not subject to escalation.

(1) Salaries and Wages:

(a) Salaries and/or wages of Contractor's U.S. source and origin United States based personnel.

(b) Salaries and/or wages of Contractor's U.S. source and origin personnel assigned to and resident in Indonesia.

(c) Costs or fees for vendors' supervisory or service personnel as may be required by Contractor either within the U.S. or in Indonesia.

(2) Cost of all material and equipment of U.S. source and origin except those which are specifically excluded from the U.S. source and origin requirement in accordance with Paragraph 7.

In general, the classes of material are:

(a) All process and service machinery and equipment such as kiln, ball mill, pumps, cranes, agitators, motors, switchgear, etc., as called for in the Technical Section.

(b) All materials entering directly into the construction such as reinforcing rod, anchor bolts, structural steel, miscellaneous steel, roofing, siding, pipe, conduit, wire, etc. Principal items such as structural steel, major platework, etc. shall be fabricated and shipped to the job site for erection or assembly. Miscellaneous metal, rebar and materials normally worked at the job site may be shipped as raw or stock materials and worked under the cost reimbursable Rupiah portion of the work.

(c) All materials required for construction such as wall ties, welding rod, cable, rope, etc.

(d) All tools and equipment required for construction such as hand tools, jack hammers, cranes, welding machines, air compressors, trucks, transport equipment.

(3) Cost of all Transportation, Hotel, and Living Expense for:

(a) Contractor's home office personnel in discharge of duties in connection with the work. In event of travel to Indonesia, costs shall include all expenses to and from Surabaja.

The above shall, also, apply to any vendor supervisory or service personnel engaged by the Contractor under this contract.

(b) Contractor's personnel assigned for residence at job site in Indonesia to and from Surabaja.

(c) All equipment and materials for use on this project as far as dock side Gresik or Surabaja.

(d) Personal possessions of Contractor's personnel to be in residence at the job site as far as dock side Gresik or Surabaja.

(e) Costs in connection with Contractor's policy concerning emergency leave or vacations for U.S. personnel assigned to Indonesia.

(4) Living expenses of Contractor's U.S. employees in residence in Indonesia but not including housing, which shall be provided by the Owner.

(5) Cost of all postal service, telephone, and telegrams, including these services to and from Indonesia but not including these services within the territorial limit of the Republic of Indonesia.

(6) All applicable taxes, fees, permits of U.S. origin applicable to the work under this project.

(7) All Contractor's overhead expenses, including but not limited to taxes or rent, insurance, furnishings, equipment, materials, etc. but excluding cost reimbursable Rupiah expenditures as covered in Paragraph 4.b.

(8) Contractor's fee or profit.

b. Cost Reimbursable Rupiah Price:

The cost reimbursable Rupiah price portion of the work shall include direct cost Rupiah expenditure within the territory of the Republic of Indonesia. The expenditures herein shall pertain to costs incurred in the discharge of the obligations in connection with the work under this contract and not pertain to the personal activities of the Contractor's U.S. personnel. Expenditures under the cost reimbursable Rupiah portion of the contract are subject to Owner's review and approval.

All wages, rates, benefits, working hours and conditions of employment shall be the prevailing standard of the borrower country. Deviations from such shall not be made without concurrence of Owner.

The direct cost of the work shall include:

(1) All Indonesian field construction labor payrolls including subsistance and travel allowance, travel time and such payments as may be required by law or established custom. All rates are not to exceed those prevailing in the area during the construction period.

(2) Cost of Indonesian subcontracts.

(3) Wages and salaries of Indonesian field office personnel such as accountants, interpreters, time keepers, watchmen, storeroom keepers, janitors, etc.

(4) All equipment, material, and supply transportation costs within the territory of the Republic of Indonesia including foreign shipment costs from dockside or airport to job site.

(5) All transportation, hotel, and living expenses incurred within the territorial limits of the Republic of Indonesia for Contractor's U.S. personnel or Indonesian personnel while away from their residence and engaged in the discharge of duties connected with the work.

(6) Cost of postal service, telephone service, and telegrams within the territorial limits of the Republic of Indonesia.

(7) All Indonesian taxes, fees, permits applicable to the work under this project.

(8) Contractor's Indonesian overhead expenses.

5. Application of Source and Origin Rules to Procurement of Equipment and Materials

a. Equipment and Material:

A.I.D. source and origin rules apply to procurement of equipment and material:

(1) With respect to equipment and materials to be incorporated in the project or otherwise transferred to the borrower, including spare parts for the same ("included commodities"), in the manner and to the extent specified in paragraph 5.b.

(2) With respect to equipment and materials to be used on the project but which will not be incorporated in the project or otherwise transferred to the Owner ("contractor-owned commodites"), in the manner and to the extent specified in paragraph 5.c.

(3) In no event may any equipment or materials, whether under (1) or (2) above, be utilized in the project unless the source and origin thereof is a country or countries included in A.I.D. Geographic Code 935 (i.e., is not of Communist Bloc source or origin).

b. Included Commodities:

Included commodities, as defined in paragraph 5.a.(1), imported for the project are subject to the following rules governing source of origin:

(1) With respect to equipment and materials, the "origin" thereof is the country in which such equipment or material was mined, grown, or produced through manufacturing, processing, or assembly, and the "source" thereof is the country or territory from which such commodity is shipped to the Owner's country, except that when equipment or materials are shipped to the Owner's country from a free port or bonded warehouse in the form in which received therein; "source" means the country or territory from which such equipment or material was shipped to such free port or bonded warehouse, except that if the equipment or material is located in the Owner's country at the time of its purchase for the project, "source" means the Owner's country. A produced commodity shall be deemed of country origin if, as a result of manufacturing, processing or assembly in such country, a commercially recognized new commodity is produced that is substantially different in basic characteristics or in purpose or utility from any of its imported components.

No produced commodity shall be eligible for A.I.D. financing if such commodity contains any component from a Communist Bloc country (i.e., a country not specified in A.I.D. Geographic Code 935). (See paragraph 5.f.).

(2) No produced commodity of United States source and origin shall be eligible for A.I.D. financing.

(a) If such commodity contains any component or components which were imported into the United States and

- such components were acquired by the producer in the form in which they were imported.

- The total cost of such components (delivered at the point of production) amounts to more than ten per cent (10%), or such other percentage as A.I.D. may specify in the loan agreement, letters of implementation, or other related documents, of the lowest price (excluding the cost of ocean transportation and marine insurance, see paragraphs 5.d. and 5.e.) at which the supplier makes the commodity available for export sale, whether or not financed by A.I.D.

(b) If such commodity has been transported to the Owner's country:

- by a transportation medium owned, operated, or under the control of any Communist Bloc country (i.e., a country not specified in A.I.D. Geographic Code 935).

- From the United States on a vessel which A.I.D., by written notice to the Owner, has designed as ineligible.

- Under any ocean or air charger which has not received prior approval by A.I.D.

c. Contractor-owned Equipment:

(1) Prior-owned equipment and materials:

Equipment and materials owned or leased by the Contractor prior to the opening of bids for the contract shall not be subject to A.I.D. source and origin requirements other than the Communist Bloc source and origin rule specified in paragraph 5.a.

(2) Equipment and materials acquired for the project:

Subsequent to the opening of bids for the contract and unless otherwise specified in the IFB, equipment and materials purchased or leased by the Contractor for construction or incorporation in the project shall be subject to

A.I.D.'s source and origin requirements for the project. However, Contractor procurement of spare parts reasonably required for the maintenance during the construction of the project of prior owned or leased construction equipment of non-U.S. source and origin pursuant to paragraph 5.c. shall not be subject to A.I.D.'s source and origin requirements for the project other than the Communist Bloc source and origin rule specified in paragraph 5.a.(3).

(3) The provisions of paragraphs 5.d and 5.e apply.

(4) Waivers:

The source and origin requirements of paragraphs 5.b. and 5.c. will be waived by A.I.D. only to meet anticipated emergency or special requirements. An adjustment in the contract price will be made to reflect any savings by the Contractor resulting from such waivers; any waiver request will require advance approval by the Owner and A.I.D.

d. Ocean, Air, Non-local Transportation:

A.I.D. source and origin rules apply to ocean, air and other non-local transportation.

(1) Ocean freight costs and delivery services, including shipments of equipment and materials of United States source and origin other than with respect to prior owned Contractor-owned equipment and materials referred to in paragraph 5.c.(1), shall be deemed to be financed by A.I.D. and all such shipments shall therefore be made on U.S. flag vessels, except where:

(a) It is clearly established that ocean freight was not financed with A.I.D. funds.

(b) Freight on non-U.S. flag vessels, provided they are not of Communist Bloc source and origin (i.e., a country not included in A.I.D. Geographic Code 935), will be financed if A.I.D. determines that U.S.

flag vessels are not available, in which event, an appropriate adjustment will be made in the contract price.

(c) Approval by A.I.D. of ship charters on U.S. flag vessels will not be required. Transportation shall be deemed to have their source and origin in United States if procurred from a U.S. flag carrier. In no event shall the borrower fail to meet the requirements of paragraph 5.d.(2).

(2) Owner shall insure that at least 50 per cent (50%) of the gross tonnage of all A.I.D. financed equipment and material of United States source and origin procurred by Contractor and all included commodities and Contractor owned commodities, except prior owned commodities referred to in paragraph 5.c.(1) (computed separately for dry bulk carrier, dry cargo liners, and tankers), unless A.I.D. has otherwise specified, which shall be transported on ocean vessels shall be transported on privately owned United States flag commercial vessels to the extent such vessels are available at fair and reasonable rates for United States flag commercial vessels. This rule applies whether or not A.I.D. finances such transportation. No goods may be financed hereunder which are transported on any ocean vessel or aircraft which A.I.D., in a notice to the Owner, has designated as ineligible to carry A.I.D. financed commodities or which has been chartered for the carriage of A.I.D. financed commodities unless such charter has been approved in advance by A.I.D.

e. Marine Insurance:

If A.I.D. at any time shall determine that the government of a borrower country by statute, decree, rule, or regulation discriminates with respect to A.I.D. financed procurement, against any marine insurance company authorized to do business in any state of the United States, then A.I.D. may require that any A.I.D. financed equipment or materials thereafter shipped to the borrower country shall be

insured against marine risks and that such insurance shall be placed in the United States with a company or companies authorized to do a marine insurance business in a state of the United States. "Discrimination" within the meaning of this section may be found to exist whenever the effect of governmental action by the borrower country is to hinder an importer in entering into a c.i.f. contract with a United States supplier or in instructing a United States supplier to place marine insurance in the United States.

f. Bloc Furnished Materials, Equipment and Services:

No equipment, materials, or services, whether or not A.I.D. financed, except ocean freight in connection with equipment or materials not financed by A.I.D. may be utilized in the project if the source and origin thereof is a Communist Bloc country (i.e., a country not specified in A.I.D. Geographic Code 935). Exceptions to this rule may be permitted by A.I.D. on a case-by-case basis for items of such source and origin generally available in the local market or in other specific circumstances.

6. Source and Origin

Except as specifically exempt in paragraph 7, or otherwise provided in Paragraph 5 all materials, equipment, personnel, and services are to be of U.S. source and origin.

7. Exemptions from U.S. Source and Origin Requirement

The following are excluded from the United States source and origin requirements provided that they are procured from a "local source or origin" through a "local firm."

a. Cement.

b. Concrete Aggregate.

c. Building Brick and Concrete Block.

d. Lumber.

e. Nails.

f. Skilled and Unskilled Indigenous Construction and Administrative Personnel.

g. Construction Services as Provided by a "Local Firm" Through Subcontract Agreement.

h. Transportation Within the Territories of the Republic of Indonesia.

i. Third Party Nationals as Covered in Paragraph 2.

8. Material and Equipment Procurement

Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, tools, equipment, transportation and facilities necessary for the execution and completion of the work, both under the fixed U.S. dollar price and cost reimbursable rupiah price portions of the contract with the exception of those items being provided to the Contractor by the Owner.

Materials and products used on the work must be approved for use by the Owner. The Contractor shall furnish satisfactory evidence as to the kind and quality of materials. Substitute materials, even though approved by the Owner, must meet all performance requirements for the work and the Contractor shall be fully responsible for the life and service of such materials. Unless otherwise provided in the specifications, all equipment and materials incorporated in the work shall be new and workmanship, equipment, and materials shall be of the best grade of their respective kinds for the work.

This project is exempt from United States Government excess property policies and regulations.

9. Schedule of Order of Completion

The Contractor shall submit, within 30 days after award of contract, a progress schedule which shall show the order in which the Contractor proposes to execute both the engineering and construction phases of the work with dates at which the Contractor will start the various parts of the work and estimated dates of completion of

the various parts. Progress on this schedule shall be reported on a monthly basis to the Owner. The Contractor shall also submit, at such times as may be requested by the Owner, detailed schedules of various portions of the work as may be necessary for proper control of the work.

The Contractor, without waiting until the report period, shall report promptly to the Owner the occurence of any event or condition that might delay or prevent completion of the project in accordance with approved schedules and to indicate steps taken to correct the delays.

10. Drawings and Specifications on the Work

The contractor shall prepare or in the case of equipment, etc., provide vendors' drawings and specifications for all phases of the work. He shall not procede with any portion of the work without such drawings and specifications approved by the Owner and released for construction.

The Contractor shall keep one copy of all drawings and specifications on the work in good order available to the Owner and to his representatives. This set of drawings shall be corrected by the Contractor on a current basis to show as-built dimensions. All such data shall be transferred to the original drawings prior to termination of the contract.

Drawings and specifications are to be provided in accordance with requirements of the special conditions.

The original tracings of drawings prepared under this contract are the property of the Owner and are to be delivered to the Owner prior to final payment.

11. Contractor's Understanding

It is understood and agreed that the Contractor has, by careful examination, satisfied himself as to the nature and location of the work; the conformation of the ground; the character, quality and quantity of the materials to be encountered; the character of equipment and facilities needed preliminary to and during the prosecution of the work; the general and local conditions; and all other

matters which can in any way affect the work under this contract. No verbal agreement or conversations with any officer, agent, or employee of the Owner, either before or after the execution of this contract, shall affect or modify any of the terms or obligations herein contained.

12. Permits, Licenses, and Other Fees

All permits and licenses required for the prosecution of the fixed U.S. dollar price portion of the work shall be secured and paid for by the Contractor.

All permits and licenses for the prosecution of the cost reimbursable local currency price shall be paid for by the Owner. Owner will assist Contractor in obtaining all such items.

13. Taxes

All United States taxes, Federal, state, or local, applicable to all or any portion of the work under the fixed U.S. dollar price portion of the work shall be paid for by the Contractor.

Pursuant to Section 6.5 of the Loan Agreement, dated July 25, 1969, between the Government of Indonesia, Gresik, and the United States of America, the Contractor will be exempt from taxes, duties, levies or other assessments or charges made by the Indonesian Government or agencies thereof in connection with the provision of services and commodities under this contract. In event that any such assessments are made, they shall be paid in accordance to paragraph 4.b covering the definition of the cost reimbursable Rupiah portion of the work.

14. Governmental Regulations

The Contractor's obligations under this contract, as applicable, are subject to all United States and Republic of Indonesia Governmental priorities, restrictions, or orders now or hereafter in force.

15. Modification or Amendment

No modifications or amendments outside of "Changes" clause below shall be made to this contract unless approved in writing by A.I.D.

16. Changes

The Owner may, at any time, by a written order and with the approval of A.I.D. make changes within the general scope of this contract in any one or more of the following:

a. State of work or services.

b. Drawings, designs, or specifications.

c. The amount of logistic support and property to be furnished or made available to the Contractor for performance of this contract.

If any such change causes an increase or decrease in contract price, time of completion or constitutes a substantial modification of the technical specifications, A.I.D. approval is required. Any such change not approved by A.I.D. will not be financed by the A.I.D. loan. Upon approval by A.I.D. an equitable adjustment shall be made and the contract shall be modified in writing accordingly. Any claim by the Contractor for adjustment under this clause must be asserted within sixty (60) days from the date of receipt by the Contractor of the notification of approved change provided, however, that the Owner, if he decides that there are special facts justifying such action, may receive and act upon any such claim asserted at any time prior to final payment under this contract. Failure to agree to any adjustment shall be a dispute concerning a question of fact within the meaning or the clause of this contract entitled "Disputes." However, nothing in this clause shall excuse the Contractor from proceeding with the contract as changed.

17. Contractor-U.S.A.I.D. Relationship

This contract is an important part of the United States International Development Program and the Contractor's operations and those of its employees in the Cooperating Country will be carried out in such a manner as to be full commensurate with the responsibilities which

this entails. The U.S.A.I.D. Director is the chief representative of A.I.D. in the Cooperating Country. In this capacity he has responsibility for the total A.I.D. program in the Cooperating Country, including certain responsibilities for the administration of this contract and for advising A.I.D. regarding the performance of the work under the contract and its effects on the International Development Program. Although Contractor will be responsible for all professional and technical details of the work in this contract, he shall keep the U.S.A.I.D. Director or his designated representative currently informed of the progress of the work under this contract.

18. Contractor's Employees

a. At all times in all work covered by this contract, Contractor shall maintain his status as an independent Contractor and shall exercise complete control over his employees. Contractor and his employees shall conform to all specific laws, regulations, and ordinances promulgated by legally constituted authorities of the Cooperating Country and shall promptly correct any violations thereof called to their attention.

b. Contractor shall be responsible for the professional and technical competence of his employees and will use his best efforts to select and employ for work in the Cooperating Country only those persons who in his judgement will be reliable and most likely to perform satisfactorily and who will comply with local laws, respect the local customs and conform to a high standard of moral and ethical conduct. Contractor shall furnish to A.I.D., as it may require, on forms provided by A.I.D., biographical information including citzenship, experience, references and character information concerning all proposed employees prior to their assignment to work in the Cooperating Country and with respect to all such information Contractor shall take such measures as are reasonable to assure the accuracy and correctness thereof. No person shall depart for the Cooperating Country or begin work in the Cooperating Country prior to A.I.D.'s approval, notice of which shall

first be given in writing to Contractor. Contractor further agrees, on written request of A.I.D., to terminate the employment under this contract of any of its employees in the Cooperating Country if A.I.D. determines that such termination is required.

c. Prior to employment of any Cooperating Country nationals or local labor, Contractor shall consult with the U.S.A.I.D. Director or such other official as he may designate, with respect to the existing local labor laws, regulations and labor standards with a view to adopting and demonstrating good employment practices.

d. Other than for work to be performed under this contract for which an employee is assigned by Contractor, no employee of Contractor shall engage directly or indirectly, either in his own name or in the name or through the agency of another person or entity, in any business, profession or occupation in the Cooperating Country; nor shall he make loans to or investment in any business, profession or occupation in the Cooperating Country.

e. The extent of Contractor employee's personal possessions including private automobiles shipped to Indonesia shall be subject to the rules and regulations of the Republic of Indonesia.

19. <u>Insurance</u>

a. Workman's Compensation Insurance:

(1) The Contractor shall provide and thereafter maintain workmen's compensation insurance as required by United States Public Law 208, 77th Congress, as amended (42USC 1651 et seq.), with respect to and prior to the departure for overseas employment under this contract of all employees who are hired in the United States or who are American citizens or bona fide residents of the United States.

(2) The Contractor shall further provide for all employees who are nationals or permanent residents of the country in which services are being rendered security for compensation benefits pursuant to the applicable law of such country

for injury or death in the course of such employment, or in the absence of such law, employer's liability insurance. For all other authorized employees not hired in the United States or who are not American Citizens or bona fide residents of the United States, Contractor shall provide the necessary employer's liability insurance

(3) The Contractor agrees to insert the provisions of this clause including this paragraph in all subcontracts or subordinate contracts exclusively for furnishing materials or supplies.

b. Insurance on Private Automobiles:

If Contractor or any of its employees or their dependents transport or cause to be transported (whether or not at contract expense) privately owned automobiles to the Cooperating Country or they or any of them purchase an automobile within the Cooperating Country will be covered by a paid-up insurance policy issued by a reliable company providing the following minimum coverages, payable in U.S. dollars or its equivalent in the currency of the Cooperating Country: injury to persons, $10,000/ $20,000; property damage, $5,000. Contractor further agrees to deliver or cause to be delivered to the Owner the insurance policies required by this clause or satisfactory proof of the existence thereof, before such automobiles are operated within the Cooperating Country.

c. Limits of Coverage by Contractor:

Contractor shall maintain in full force and effect until the work has been accepted by the Owner, the following insurance coverages in the minimum limits specified as will protect the Owner and the Contractor from all claims, losses, suits, judgements, costs, including court costs and reasonable attorney's fees for bodily injury, including death, and for property damage arising out of the work whether caused by the acts or omissions of the Contractor, his agents, representatives, servants, employees or subcontractors.

These insurances shall be placed with a company acceptable to the Owner and certificates of insurance evidencing these coverages shall be filed with the Owner before the work is started. Said certificates shall stipulate that the insurances will not be altered or cancelled without at least ten (10) days' prior written notice having been sent to the Owner by registered mail.

Coverages	Minimum Limits
Workmen's Compensation and Occupational Disease Coverage subject to applicable laws	Statutory
Employer's Liability Insurance	Unlimited, except Disease limited to $500,000 annual aggregate
Comprehensive General Liability Insurance Including Personal Injury Liability and Property Damage Liability on an "occurrence" basis; Contractor's Protection Coverage; coverage for blasting damage, building collapse, damage to underground utilities; Blanket Contractural Liability Insurance; and Completed Operations Insurance	
Personal Injury Liability	$1,000,000 per person $1,000,000 per occurrence
Property Damage Liability	$1,000,000 per occurrence $1,000,000 annual aggregate

Coverages	Minimum Limits
Comprehensive Automobile Liability Insurance Covering the use of all owned, non-owned, and hired automobiles	
Bodily Injury	$1,000,000 per person $1,000,000 per accident
Property Damage	$1,000,000 per accident

Physical Damage:
The Contractor shall, during the progress of the work, effect and maintain All Risk Installation Floater Insurance upon the entire structure on which the work of this contract is to be done to 100% of the insurable value thereof, including items of labor and materials connected therewith located on the site, materials in place or to be used as part of the permanent construction including surplus materials and supplies incidental to work, and such scaffolding, stagings, towers, forms, and equipment as are not owned or rented by Contractor, the cost of which is included in the cost of the work; and including Transit coverage for all materials, supplies and equipment which are included as a cost of the work.

Contractor shall maintain on its construction equipment a Contractor's Equipment Floater

20. Accounts, Records and Inspection

The Contractor shall maintain accounts showing and supporting all vouchers submitted for payment under this contract and the receipt, use, and disposition of all property coming into the possession of the Contractor under this contract. The system of accounts employed by the Contractor shall be satisfactory to Owner and in accordance with generally accepted accounting principles. All books of account and records relating to this contract shall be subject to inspection and audit by Owner, or A.I.D., or any of their duly authorized representatives at all reasonable times, and the Contractor shall afford Owner proper facilities for such inspection and audit. Contractor agrees to permit authorized representatives at all reasonable times to inspect the facilities, activities and work pertinent to the contract, either in the United States or abroad, and to interview personnel engaged in the performance of the contract to the extent deemed necessary by Owner. The Contractor further agrees to require the inclusion of provisions similar to those above in all subcontracts hereunder.

21. Examination of Records

a. The Contractor agrees that Owner or A.I.D. or any of their duly authorized representative shall, until the expiration of three years after final payment under this contract, have access to and the right to examine any books, documents, papers, and records of the Contractor involving transactions related to this contract.

b. The Contractor agrees further to include in all his subcontracts hereunder a provision to the effect that the subcontractor agrees that the Owner or A.I.D. or any of their duly authorized representatives shall, until the expiration of three (3) years after final payment under the subcontract, have access to and the right to examine any books, documents, papers and records of such subcontractor involving transactions related to the subcontract. The term "Subcontract," as used in this clause, excludes:

(1) purchase orders not exceeding $2,500 and

(2) subcontractors or purchase orders for public utility services at rates established for uniform applicability to the general public.

22. Reports and Information

All information gathered under this contract by Contractor and all reports and recommendations hereunder shall be treated as confidential by the Contractor and shall not, without Owner's written approval, be made available to any person, party or government other than A.I.D., except as otherwise expressly provided in the contract.

Monthly and quarterly progress reports shall be prepared and distributed by the Contractor as established in the Procedure Manual. The report shall show the amount of work completed and shall include photographs or other pictorial or graphical enclosures necessary to convey progress information. The report shall also contain such additional information as requested by Owner which may be necessary for the preparation of his reports to A.I.D.

23. Subcontracts

Contractor shall not subcontract any of the work covered hereunder in whole or part to the extent that such contract will constitute an assignment of the Contractor's rights and obligations under this contract.

Subcontracting, as employed in normal construction procedures for furnishing a service or material worked to a special design in accordance to the plans and specifications of the work is permitted subject to the approval of the Owner and A.I.D.

Except as may otherwise be provided in this contract, the term "subcontract" includes purchase orders under this contract.

24. Language, Weights and Measures

The English language shall be used in all written communications between the parties under this contract with respect to services to be rendered and with respect to all documents prepared by the Contractor except as otherwise provided in the contract or as authorized by the Owner. Wherever weights and measures are required or authorized, all quantities and measures shall be made, computed and recorded.

25. Notices

Any notice given by any of the parties hereunder, shall be sufficient only if in writing and delivered in person or sent by telegraph or cable or registered mail as follows:

To Owner	P. T. Semen Gresik (Persero) Djl. Veteran Gresik, Indonesia
To Contractor	Principal business address for this contract as indicated in contract.
To A.I.D.	United States Agency for International Development c/o American Embassy Djakarta, Indonesia

or to such other address as either of such parties shall designate by notice given as herein required. Notices hereunder shall be effective when delivered.

26. Covenant Against Contingent Fees

The Contractor warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business. For breach or

violation of this warranty, Owner shall have the right to annul this contract without liability or in its discretion to deduct from the contract price or consideration the full amount of such commission, percentage, brokerage, or contingent fee.

27. Default

a. The Owner may, subject to the provisions of paragraph c. below, by written notice of default to the Contractor, terminate the whole or any part of this contract in any one of the following circumstances:

(1) if the Contractor fails to make delivery of the supplies or to perform the services within the time specified herein or any extension thereof; or

(2) if the Contractor fails to perform any of the other provisions of this contract, or so fails to make progress as to endanger performance of this contract in accordance with its terms and in either of these two circumstances does not cure such failure within a period of ten days (or such longer period as the Owner may authorize in writing) after receipt of notice from the Owner specifying such failure.

b. In the event the Owner terminates this contract in whole or in part, as provided in paragraph a. of this clause, the Owner may procure, upon such terms and in such manner as the Owner may deem appropriate, supplies or services similar to those so terminated; and the Contractor shall be liable to the Owner for any excess costs for such similar supplies or services, provided, that the Contractor shall continue the performance of this contract to the extent not terminated under the provisions of this clause.

c. Except with respect to defaults of subcontractors, the Contractor shall not be liable for any excess costs if the failure to perfrom the contract arises out of causes beyond the control and without the fault or negligence of the Contractor. Such causes may include but are not restricted to acts of God or of the public enemy, acts of the U.S.A. or Cooperating Government in either its sovereign or contractural capacity, fires, floods, epidemics, quarantine restrictions, strikes, freight embargos, and unusually severe weather; but in every case the failure to

perform must be beyond the control and without the fault or negligency of the Contractor. If the failure to perform is caused by the default of a subcontractor and if such default arises out of causes beyond the control of both the Contractor and subcontractor and without the fault or negligency of either of them, the Contractor shall not be liable for any excess costs for failure to perform, unless the supplies or services to be furnished by the subcontractor were obtainable from other sources in sufficient time to permit the Contractor to meet the required delivery schedule.

d. If this contract is terminated as provided in paragraph a. of this clause, the Owner, in addition to any other rights provided in this clause, may require the Contractor to transfer title and deliver to the Owner, in the manner and to the extent directed by the Owner.

(1) any completed supplies and

(2) such partially completed supplies and materials, parts, tools, dies, jigs, fixtures, plans, drawings, information and contract rights (hereinafter called "manufacturing materials") as the Contractor has specifically produced or specifically acquired for the performance of such part of this contract as has been terminated; and the Contractor shall, upon direction of the Owner, protect and preserve property in possession of the Contractor in which the Owner has an interest. Payment for completed supplies delivered to and accepted by the Owner shall be at the contract price. Payment for manufacturing materials delivered to and accepted by the Owner and for protection and preservation of property shall be in an amount agreed upon by the Contractor and Owner; failure to agree to such amount shall be a dispute concerning a question of fact within the meaning of the clause entitled "Disputes."

e. If, after notice of termination of this contract under the provisions of paragraph a. of this clause, it is determined that the failure to perform this contract is due to causes beyond the control and without the fault or negligence of the Contractor or

subcontractor pursuant to the provisions of paragraph c. of this clause, such notice of default shall be deemed to have been issued pursuant to the clause entitled "Termination for Convenience of the Owner," and in such event be governed by such clause.

f. The rights and remedies of the Owner provided in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract.

28. Termination for Convenience of the Owner

a. The performance of work under this contract may be terminated by the Owner in accordance with this clause, in whole or from time to time in part, whenever the Owner shall determine that such termination is in the best interests of the Owner. Any such termination shall be effected by delivery to the Contractor of a Notice of Termination specifying the event to which performance of work under the contract is terminated and the date upon which such termination becomes effective.

b. After receipt of a Notice of Termination and except as otherwise directed by the Owner, the Contractor shall:

(1) stop work under the contract on the date and to the extent specified in the Notice of Termination;

(2) place no further orders or subcontracts for materials, services, or facilities except as may be necessary for completion of such portion of the work under the contract as is not terminated;

(3) terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the Notice of Termination;

(4) assign to the Owner, in the manner, at the times and to the extent directed by the Owner, all of the right, title, and interest of the Contractor under the orders and subcontracts so

terminated in which case the Owner shall have the right in its discretion to settle or pay any or all claims arising out of the termination of such orders and subcontracts;

(5) settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts to the extent he may require which approval or ratification shall be final for all the purposes of this clause;

(6) transfer title and deliver to the owner, in the manner, at the times and to the extent, if any, directed by the Owner,

(a) the fabricated parts, work in process, completed work, supplies and other material produced as a part of or acquired in connection with the performance of the work terminated by the Notice of Termination;

(b) the completed or partially completed plans, drawings, information and other property which, if the contract had been completed, would have been required to be furnished to the Owner.

(7) use its best efforts to sell in the manner, at the times, to the extent and at the price or prices directed or authorized by the Owner any property of the types referred to in provision (6) of this paragraph provided, however, that the Contractor

(a) shall not be required to extend credit to any purchaser and

(b) may acquire any such property under the conditions prescribed by and at a price or prices approved by the Owner and provided further that the proceeds of any such transfer or disposition shall be applied in reduction of any payments to be made by the Owner to the Contractor under this contract or shall otherwise be credited to the price or cost of the work covered by

this contract or paid in such other manner as the Owner may direct;

(8) complete performance of such part of the work as shall not have been terminated by the Notice of Termination; and

(9) take such action as may be necessary or as the Owner may direct for the protection and preservation of the property related to this contract which is in the possession of the Contractor and in which the Owner has or may acquire an interest.

The Contractor may submit to the Owner a list certified as to quantity and quality of any or all items of termination inventory not previously disposed of, exclusive of items the disposition of which has been directed or authorized by the Owner, and may request the Owner to remove such items or enter into a storage agreement covering them. Not later than fifteen days thereafter, the Owner will accept title to such items and remove them or enter into a storage agreement covering the same, provided that the lists submitted shall be subject to verification by the Owner upon removal of the items or if the items are stored within forty-five (45) days from the date of submission of the list and any necessary adjustment to correct the list, as submitted, shall be made prior to final agreement.

c. After receipt of a Notice of Termination, the Contractor shall submit to the Owner its termination claim in the form and with the certification prescribed by the Owner. Such claims shall be submitted promptly but in no event later than six months from the effective date of termination, unless one or more extensions in writing are granted by the Owner upon request of the Contractor made in writing within such six-month period or authorized extension thereof. However, if the Owner determines that the facts justify such action, he may receive and act

upon any such termination claim at any time after such one-year period or extension thereof. Upon failure of the Contractor to submit its termination claim within the time allowed, the Owner may determine on the basis of information available to him the amount, if any, due to the Contractor by reasons of the termination and shall thereupon pay to the Contractor the amount so determined.

d. Subject to the provisions of paragraph c., the Contractor and the Owner may agree upon the whole or any part of the amount or amounts to be paid to the Contractor by reason of the total or partial termination of work pursuant to this clause, which amount or amounts may include a reasonable allowance for profit on work done provided that such agreed amount or amounts, exclusive of settlement costs, shall not exceed the total contract price as reduced by the amount of payments otherwise made and as further reduced by the contract price of work not terminated. The contract shall be amended accordingly and the Contractor shall be paid the agreed amount. Nothing in paragraph e. of this clause prescribing the amount to be paid to the Contractor in the event of failure of the Contractor and the Owner to agree upon the whole amount to be paid to the Contractor by reason of the termination of work pursuant to this clase shall be deemed to limit, restrict, or otherwise determine or affect the amount or amounts which may be agreed upon to be paid to the Contractor pursuant to this paragraph d.

e. In the event of the failure of the Contractor and the Owner to agree as provided in paragraph d. upon the whole amount to be paid to the Contractor by reasons of the termination of work pursuant to this clause, the Owner shall determine, on the basis of information available to him, the amount, if any, due to the Contractor by reason of the termination and shall pay to the Contractor the amounts determined.

f. The Contractor shall have the right of appeal under the clause of this contract entitled "Disputes" from any determination made by the Owner under paragraphs c. or e. above, except that if the Contractor has failed to submit its claim within the time provided in paragraph c. above and has failed to request extension of such time, he shall have no such right of appeal. In any case where the Owner has made a determination of the amount due under paragraph c. or e. above, the Owner shall pay to the Contractor the following:

(1) if there is no right of appeal hereunder or if no timely appeal has been taken, the amount so determined by the owner; or

(2) if any appeal has been taken, the amount finally determined on such appeal.

g. In arriving at the amount due the Contractor under this clause, there shall be deduced

(1) all unliquidated advance or other unliquidated payments on account theretofore made to the Contractor,

(2) any claim which the Owner may have against the Contractor in connection with this contract; and

(3) the agreed price for or the proceeds of sale of any materials, supplies, or other things acquired by the Contractor or sold pursuant to the provisions of this clause and not otherwise recovered by or credited to the Owner.

h. If the termination hereunder be partial prior to the settlement of the terminated portion of this contract, the Contractor may file with the Owner a request in writing for an equitable adjustment of the price or prices specified in the contract relating to the continued portion of the contract (the portion not terminated by the Notice of Termination) and such aquitable adjustment as may be agreed upon shall be made in such price or prices.

j. The Owner may, from time to time under such terms and conditions as it may prescribe, make partial payments and payments on account against costs incurred by the Contractor in connection with the terminated portion of this contract whenever, in the opinion of the Owner, the aggregate of such payments shall be within the amount to which the Contractor will be satisfied hereunder. If the total of such payments is in excess of the amount finally agreed or determined to be due under this clause, such excess shall be payable by the Contractor to the Owner upon demand, together with interest computed at the rate of six per cent (6%) annum for the period from the date such excess payment is received by the Contractor to the date on which such excess is repaid to the Owner provided, however, that no interest shall be charged with respect to any such excess payment attributable to a reduction in the Contractor's claim by reason of retention or other disposition of termination inventory until ten (10) days after the date of such retention or disposition.

k. Unless otherwise provided for in this contract or by applicable statute, the Contractor from the effective date of termination and for a period of three years after final settlement under this contract shall preserve and make available to the Owner at all reasonable times at the office of the Contractor but without direct charge to the Owner all its books, records, documents and other evidence bearing on the costs and expenses of the Contractor under this contract and relating to the work terminated hereunder or to the extent approved by the Owner, photographs, microphotographs or other authentic reproductions thereof.

29. <u>Adjustment for Force Majeure</u>

In the event

a. Contractor is wholly prevented from performance of the contract work in the Cooperating Country continuously over a period in excess of fifteen consecutive days, Contractor would not, under the provision of paragraph 29 entitled "Default," be liable for any excess costs for such failure to perform.

b. Contractor promptly, and in any event within 30 days from the beginning of such prevention of performance, notifies the Owner in writing of the prevention of performance and the cause thereof.

c. If such prevention of performance causes an increase in the Contractor's cost of or the time required for performance of this contract, an equitable adjustment shall be made; and the contract shall be modified in writing accordingly, provided that the Contractor shall, within ninety (90) days after the discontinuance of the cause of prevention of performance, file a written claim with the Owner or give notice to the Owner of its intention to claim an adjustment and the basis therefor. If the Contractor fails to file such claim or give the required notice within the time specified, it shall be deemed to have waived its right to any adjustment with respect to such prevention of performance. Failure to agree on an equitable adjustment under this clause shall be deemed to be a dispute within the meaning of the clause entitled "Disputes."

30. Diversion Rights

In the event that at any time an event occurs that A.I.D. determines to be an extraordinary situation that makes it improbable that the purpose of the project to be attained then A.I.D. may, at its option and at its expense, direct that title to goods purchased for the project shall be transferred to A.I.D. if the goods are from a source outside the country of the Owner, are in a deliverable state and have not been off-loaded in Ports of Entry of the country of the Owner.

31. Performance Guaranties

To assure compliance with the terms of the contract, the Contractor shall furnish a performance bond or bank guaranty in the amount of not less than thirty per cent (30%) of the contract amount (U.S. dollars plus other currencies) with surety or sureties who are acceptable to the Owner. These bonds or guaranties are to be issued by satisfactory U.S. or U.S. controlled local or

local surety companies of insurance companies or banks, provided they meet U.S. Treasury criteria and the premiums thereon (which in the case of fixed price contracts are included in the lump sum price or unit prices as the case may be). These guaranties shall remain in full force and effect until the Contractor has performed fully hereunder, including any period provided for in the contract covering correction of work, equipment guaranties and others. No separate payment will be made for the performance bonds, and the entire cost thereof shall be included in prices bid for the various work items. Other forms of security such as deposit of cash or securities in the percentages, amounts, and payable or denominated in the currencies previously specified above are permitted subject to approval of Owner.

32. Payment Guaranties

To assure prompt payment to all persons supplying labor and material in the prosecution of the work under the contract, the Contractor shall furnish a payment bond or bank guarantee in the amount of not less than thirty per cent (30%) but not more than fifty per cent (50%) of the contract amount (U.S. dollars plus other currencies) or $2,500,000, whichever is less with surety or sureties who are acceptable to the Owner. These bonds or guaranties are to be issued by satisfactory U.S. or U.S. controlled local or local surety companies of insurance companies or banks, provided they meet U.S. Treasury criteria and the premiums thereon (which in the case of fixed price contracts are included in the lump sum price or unit prices as the case may be). These guaranties shall remain in full force and effect until the Contractor has performed fully hereunder. No separate payment will be made for payment bonds, and the entire cost thereof shall be included in the prices bid for the various items in the schedule of prices. Other forms of security such as deposit of cash or securities in the percentages, amounts, and payable or denominated in the currencies previously specified above are permitted subject to approval of Owner.

33. Specific Risk Investment Guaranty

A United States construction contractor with a contract to perform work that is partially or wholly A.I.D. financed may be eligible for investment guaranties under FAA of 1961, as amended. The specific risks which may be covered by such guaranties are:

a. Inability to convert actual profits or earnings or return of the original investment into dollars.

b. Loss of investment due to expropriation, nationalization or confiscation by the foreign government.

d. Damage to or destruction of tangible property attributable to the investment as a result of war, revolution or insurrection.

For these specific risks, eligibility requirements and procedure for obtaining A.I.D. guaranty refer to Specific Risk Investment Guaranty Handbook obtained from Insurance Division, Office of Private Resources, Department of State, Agency for International Development, Washington, D.C. 20523.

34. Guarantee - Work & Material and Production

a. Work and Material:

The Contractor shall guarantee that the work done under this contract shall be free from faulty materials and workmanship and shall remedy, repair, or replace or cause to be remedied, repaired or replaced at no expense to the Owner any such faulty items for a period of one year from the date of final payment.

b. Production:

The Contractor shall guarantee the production of the items of equipment or equipment systems installed under this contract to operate, handle or produce the quantities set forth in these contract documents. He shall modify or replace all items required to meet the production requirements at no expense to the Owner.

Ten per cent (10%) of the Contractor's periodic payments of the U.S. dollar portion of the work shall be withheld until all performance requirements have been met and the Owner has accepted the work. Such retention shall be paid to the Contractor upon submission of invoice, acceptance certificate, and other documentation as set forth in Article IV of the contract.

Acceptance shall be in accordance to paragraph 35.

35. Start-Up and Acceptance Tests

Upon completion of construction of the work under this contract, the Contractor shall conduct all necessary tests or check-out, start-up and operate all items of equipment and/or equipment systems and make all necessary adjustments and modifications prior to conducting the acceptance test.

A test run of seven (7) days (168 hrs.) duration without failure or interruption is to be made under the supervision of the Contractor's representatives for the following systems:

a. Clinker Grinding System

b. Clinker Producing Facility

The Owner shall furnish necessary labor, raw material, power, supplies and other items normal to operation.

The Contractor will be deemed to have met his obligation on these two processes if the quantities and quality of product as called for in Technical Section TS-9, paragraph 9.2.4 and 9.2.6 are maintained for the test period.

The output of the Clinker Grinding System shall be established volumetrically by measuring the volume of the cement pumped into storage bins made available for the acceptance test.

The output of the Clinker Burning System shall be by measuring the slurry volume at the specified moisture

content fed to the kiln during the test period and calculating the output based on the total suspended solids and a ratio of raw material to clinker of 1.6 to 1.

Miscellaneous items of equipment not in the preceding two systems shall be operated to demonstrate their capability to perform in accordance to the requirements of the specifications. Items such as agitators and other items of equipment which are in general continually in operation shall be operated for seven days concurrently with the preceding tests. Equipment such as pumps, compressors, and other equipment which may be intermittent in operation shall be operated to demonstrate the specified performance. Procedures for these miscellaneous tests shall be established between the Owner and Contractor at time of preparation of Procedure Manual.

If the Contractor fails to meet the requirements of the performance tests due to a defect in design or any other reason within the area of the Contractor's responsibility, the Contractor shall take action to remedy the failure and shall repeat the tests until the guarantees are met.

All tests are to be scheduled well in advance so as to afford ample time for preparation by the Owner and time for the Owner's representative and Consultant to be present to witness the test. All tests are to be conducted within a 30 day period.

Contractor's guarantee shall be in accordance to paragraph 34 of the "General Conditions."

36. Liquidated Damages

If, for reasons within the scope of the Contractor's responsibility, the Contractor fails to complete all of the work herein within the time specified in Article II of the contract, for each calendar day that any work shall remain uncompleted, the sum of $1,000.00 will be deducted from any money due the Contractor. This deduction will be made, not as a penalty but as fixed, agreed liquidated damages for such default, inconvenience to the Owner and for reimbursing the Owner the cost of the administration of the contract. Should the amount of money otherwise due the Contractor be less than the amount of such liquidating damages, the Contractor and his Surety shall be liable to the Owner for such deficiency.

When the work is not completed within the time allowed by the Contract and the Contractor is permitted to continue and finish the work, it shall be prosecuted at as many different places, at such times, and with such forces as the Owner may direct.

Permitting the Contractor to continue and finish the work after the time fixed for its completion, shall in no way operate as a waiver on the part of the Owner of any of its rights under the Contract.

When the final acceptance has been duly made by the Owner, any liquidated damage charges shall end.

37. Indemnity

The Contractor shall indemnify and save harmless the Owner from and against all losses and all claims, demands, payments, suits, actions, recoveries and judgements of every nature and description brought or recovered against him, by reason of any act or omission of the said Contractor, his agents or employees, in the execution of the work or in the guarding of it.

38. Liens

Neither the final payment nor any part of the retained percentage shall become due until the Contractor shall deliver to the Owner a complete release of all liens arising out of this contract or receipts in full in lieu thereof and, if required in either case, an affidavit that so far as he has knowledge or information the releases and receipts include all the labor and material for which a lien can be filed; but the Contractor may, if any subcontractor refuses to furnish a release or receipt in full, furnish a bond satisfactory to the Owner to indemnify the Owner against any lien. If any lien remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all moneys that the latter may be compelled to pay in discharging such a lien, including all costs and a reasonable attorney's fee.

39. Royalties and Patents

The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall save the Owner harmless from loss on account thereof.

40. Rights of Various Interests

Wherever work being done by the Owner's forces or Contractor's is contiguous to work covered by this contract, the respective rights of the various interests involved shall be established by the Owner to secure the completion of the various portions of the work in general harmony.

41. Waiver of Specified Terms by Purchaser

It is mutually understood and agreed that any failure by the Owner at any time, or from time to time, to enforce or require the strict keeping and performance by the Contractor of any of the terms or conditions of this contract, shall not constitute a waiver by the Owner of such terms or conditions, and shall not affect or impair such terms or conditions in any way, or the right of the Owner at any time to avail itself of such remedies as it may have for any breach or breaches of such terms or conditions.

42. Legal Effects of A.I.D. Approvals

The parties hereto understand that A.I.D. has reserved certain approval rights including, but not limited to, the right to approve the terms of this contract, the Contractor, and any or all plans, reports, specifications, subcontracts, bid documents, drawings, or other documents related to this contract and the project of which it is part. The parties hereto further agree that A.I.D., in reserving any of all of the foregoing approval rights, has acted solely as a lender to assure the proper use of United States Government funds and that any decision by A.I.D. to exercise or refrain from exercising these approval rights shall be made as a lender in the course of financing this project and shall not be construed as

making A.I.D. a party to the contract. The parties hereto understand and agree that A.I.D. may, from time to time, exercise the foregoing approval rights or discuss matters related to these rights and the project of which this contract is part with the parties jointly or separately without thereby incurring any responsibility or liability to the parties jointly or to any of them.

Any approval or failure to disapprove by A.I.D. of any plan, report, specification, contract, bid document, drawing, or other documents shall not bar the borrower or A.I.D. from asserting any rights or relieve Contractor of any liability which Contractor might otherwise have to Owner or A.I.D. because of such plan, specification, contract, bid document, drawing, or other document or any performance or failure of performance thereunder or any A.I.D. Contractor's or supplier's certificate.

43. Correction of Work

If any work under this contract be done not in accordance to the requirements of the contract documents or be otherwise incorrect or defective, the Contractor shall replace or correct such defective work if so directed by the Owner without expense to the Owner.

44. Use of Completed Portions

The Owner shall have the right to take possession of and use any completed or partially completed portions of the work notwithstanding that time for completing the entire work or such portions may not have expired by such taking possession and use shall not be deemed an acceptance of any work not completed in accordance with the contract documents.

45. <u>Marking</u>

a. All commodities and their shipping containers furnished to Cooperating Countries under A.I.D. financing (whether from the U.S. or other source country) must carry the official A.I.D. emblem designed for the purpose. This identification shall be affixed by metal plate, decalcomania, stencil, label, tag, or other means depending upon the type of commodity or shipping container and the nature of the surface to be marked. The emblems placed on the commodities must be approximately as durable as the trademark or company or brand name affixed by the producer; the emblem on the shipping containers must be legible until they reach the consignee.

b. The size of the emblem may vary depending upon the size of the commodity, package, or shipping container to be marked but must be large enough to be clearly visible at a reasonable distance. In addition, the shipping container will indicate clearly the last set of digits of the A.I.D. PA, P10, or other authorization number in characters at least equal in height to the shipper's marks. The emblem will appear in the colors shown on the samples available in the office of Small Business, Agency for International Development, Washington 25, D. C., or in the offices of the U.S. A.I.D. in the respective Cooperating Countries.

c. Raw materials (including grain, coal, petroleum, oil and lubricants) shipped in bulk, vegetable fibers in bales, and semi-finished projects which are not packaged in any way are, to the extent compliance is impracticable, excepted from the marking requirements of this section. However, the emblem will be prominently displayed on all ships during loading and unloading when their cargoes consist of the above mentioned items. Appropriate emblems will be furnished by the charterers to the carriers with their charter parties.

d. If compliance with the provisions of this section is found to be impracticable with respect to other commodities, the Contractor or supplier will promptly request the Office of Small Business, Agency for

International Development, Washington 25, D.C., for an exception from the requirements of this section.

46. Protection of Work and Property

The Contractor shall continuously maintain adequate protection of all his work from damage including weather and shall protect the Owner's property from injury or loss arising in connection with this contract. He shall make good any such damage, injury, or loss, except such as may be directly due to errors in the contract documents or caused by agents or employees of the Owner. He shall adequately protect adjacent property as provided by law and the contract documents. He shall provide and maintain all public roads, passage ways, guard fences, lights and other facilities for protection required by public authority or local conditions. If any emergency affecting the safety of life or of the work or of adjoining property, the Contractor, without special instruction or authorization from the Owner, is hereby permitted to act at his discretion to prevent such threatened loss or injury and he shall so act, without appeal, if so instructed or authorized.

47. Accident Prevention

Precaution shall be exercised at all times for the protection of persons including employees and property. The safety provisions of applicable laws, rules, and regulations and building and construction codes shall be observed. Machinery and equipment shall be guarded and all hazards shall be eliminated. The general conduct of the work shall be accomplished in accordance with the same practices on construction work recommended in the latest edition of the "Manual of Accident Prevention in Construction" published by the Associated General Contractor's of America to the extent that such practices are not in contradiction of applicable laws, ordinances and regulations of the borrower country.

48. Cleaning Up

The Contractor shall, at all times, keep the premises free from accumulation of waste materials or rubbish caused by his employees or work and, at the completion of the work, he shall remove all his rubbish from and about the building and all his tools, scaffolding and surplus materials and shall leave his work "broom-clean" or its equivalent, unless more exactly specified.

49. Inspection of Works by A.I.D. and Owner

Authorized A.I.D. and Owner representatives have the right to inspect the works, materials, and constructional plants at any time. The Contractor shall cooperate and furnish A.I.D. or Owner's representatives with all available facilities and information requested.

50. Superintendence: Supervision

The Contractor shall keep on his work during its progress a competent superintendent and any necessary assistants, all satisfactory to the Owner. The superinteneent shall not be changed except with the consent of the Owner, unless the superintendent proves to be unsatisfactory to the Contractor and ceases to be in his employ. The superintendent shall represent the Contractor in his absence and all directions given to him shall be as binding as if given to the Contractor. Other directions shall be so confirmed on written request in each case. The Contractor shall give efficient supervision to the work using his best skill and attention.

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

SPECIAL CONDITIONS

1. Site Visitation

A site visitation by the Contractor is mandatory. Proposals of firms submitted without a site visitation shall be rejected.

Contractors, before submitting a proposal, shall visit the site of the work and by careful examination fully satisfy themselves as to the nature and location of the work; the conformation and character of the ground; the character, quality and quantity of the materials required; the kind of equipment and facilities needed preliminary to and during the prosecution of the work; the general and local conditions and all other matters which can, in any way, affect the work under this contract.

Each bidder shall be responsible for obtaining all data necessary for the preparation of his proposal for a turnkey engineering, procurement and construction contract of the work defined in this "Invitation for Bid."

The Owner, at the plant site, has certain drawings and data used in the construction of the original plant and the 1961 expansion. It shall be the bidder's responsibility to verify the correctness or validity of any such data. The Owner assumes no responsibility for the correctness of such data.

2. Surveys, Lines, and Grades

The Owner will furnish only the basic bench mark. The Contractor will establish his own working reference lines.

3. Verification of Dimensions

The Contractor shall make his own field measurements to insure accuracy and proper fit with existing facilities.

4. Temporary Facilities at Job Site

The Contractor shall provide the temporary facilities at the job site necessary for the execution of the work under this contract. Such facilities, at the completion of the work, including items such as plumbing fixtures, light fixtures, wiring, doors, windows, etc., incorporated therein, provided under the fixed U.S. dollar portion of the work, as covered in paragraph 15, shall become the property of the Owner or disposed of as directed by the Owner.

The temporary facilities in general are as follows:

a. Field Offices and Storage Facilities:

The Contractor shall furnish his own temporary office, storage sheds, and work shop shelters, complete with necessary utilities for the execution of the work. After completion of work, disposition of these items shall be as directed by the Owner.

b. Sanitation:

The Contractor shall furnish sanitary facilities for all his and subcontractor's employees which comply with all the regulations of the place of construction. He shall keep such accommodations in a sanitary condition and, unless directed otherwise by the Owner, at the completion of the work, remove the facilities and restore the site to its original condition. Contractor's personnel shall not be permitted to use existing plant facilities.

c. Phone and Other Communications:

The Contractor shall provide for his own phone or other communication facilities.

5. Facilities or Services Provided by Owner

The following shall be furnished by the Owner in a timely fashion so as not to delay the work.

a. Housing:

The Owner shall furnish housing, including electric power and fuel for stoves, for Contractor's personnel of U.S. source and origin.

b. Temporary Electric Power, Water and Plant Air:

The Owner shall furnish electric power, water, and plant air. The Contractor shall, however, furnish all material and labor necessary to extend these services from the point of source to point of use.

c. Materials:

The Owner shall provide the following materials required for the project:

(1) Cement

(2) Concrete Aggregates

(3) Building Brick and Concrete Block

(4) Lumber (excluding plywood or other manufactured boards)

(5) Nails

d. Owner's Cafeteria:

The Contractor's personnel shall not be permitted to use Owner's cafeteria.

6. Office Space for Owner's Representative

The Contractor shall provide office space, including furniture, utilities, and services, at his principal office or offices in the United States at which the engineering and administrative portion of the work is being done for a maximum of two representatives of the Owner for duration of the work or as long as may be required.

7. Railroad Siding & Dock

The Contractor will be permitted the use of the railroad siding and dock for delivery of materials during times that it will not interfere with the Owner's operations. The Contractor will schedule with the Owner all times at which he will use the railroad siding or dock.

8. Existing Plant Operation

The Owner's plant, at which the work is to be performed, is in full operation. Owner's operation must not be interrupted or delayed except as necessary to tie new work into the existing facility. Tie-ins with the existing facilities shall be scheduled with the approval of the Owner so as to minimize down time.

Contractor shall take all steps necessary to safeguard Owner's operating personnel and existing facilities so that the Owner, except for the tie-in shutdowns, can maintain normal production schedules.

The Contractor's personnel will not be permitted in the existing plant unless on official business or invited by the Owner.

9. Disposal

All of the Contractor's debris is to be hauled from the plant area. The Owner will advise of the sites available for disposal. Disposal shall be on property of Owner.

10. Use of Premises

The Owner shall designate the areas for storage of materials and for erection of sheds, offices, and tool houses.

Security of Contractor's stored materials will be the Contractor's responsibility.

11. Project Signs

Project signs shall be provided in accordance with A.I.D. requirements.

12. **Standards**

Reference in the specifications to standards such as ACI, ASTM, AISC, etc., shall refer to the latest issue; and all provisions of said standards shall apply to the work unless exception is specifically taken in these contract documents.

13. Drawings, Specifications, Manuals, and Spare Parts Lists

a. Contractor-prepared Drawings:

All drawings prepared by the Contractor shall be approximately 24 inches x 36 inches in size. Originals shall be linen. Contractor will submit all drawings for approval, and no phase of the work will commence until each drawing governing that particular phase has been approved.

All originals of drawings, specifications, and other documents pertaining to the project will be, and remain at all times throughout the project and thereafter, the sole property of the Owner. "As built" revisions shall be made to the original of the drawings and transmitted to the Owner upon completion of the project.

The Contractor shall submit to the Owner and, when applicable, to the consultant four (4) prints of each drawing for approval. After approval, the Contractor shall submit six prints of each drawing released for construction and, when applicable, two (2) prints of each drawing to the consultant.

b. Detail and Vendor Drawings:

It shall be the responsibility of the Contractor to provide, either himself or through his subcontractors and suppliers, all necessary shop detail fabrication drawings and all detail drawings for field erection of machinery and equipment.

Shop drawings and schedules of all trades shall be submitted only by the Contractor who shall indicate by a signed stamp that he has checked them and that work shown is in accordance with contract requirements

and that all dimensions and relationships with work of other trades involved have been checked. Drawings submitted without this signed stamp shall be returned for checking.

The Contractor shall submit to the Owner and, when applicable, to the Consultant four (4) copies of shop details, erection plans, bending diagrams for reinforcing steel, and equipment drawings covering all items being furnished under the contract. After approval, the Contractor shall furnish six copies and one reproducible of final drawings to the Owner and, when applicable, two (2) copies to the consultant.

It is expressly understood, however, that approval by the Owner of the Contractor's working drawings does not relieve the Contractor of any responsibility for the accuracy of dimensions nor the proper installation of the items covered by the approved drawings.

The Contractor shall submit the drawings in sufficient time to allow discussion and correction prior to beginning the work they cover. Delay to the work caused by late submission of shop drawings shall be the responsibility of the Contractor.

c. Operation and Maintenance Manuals:

The Contractor, prior to check out and start up of equipment, shall provide the Owner with four (4) complete sets of all operation and maintenance manuals including all final applicable drawings for all equipment being furnished under this contract.

d. Spare Parts List:

The Contractor shall furnish to the Owner, prior to completion of the work, four (4) copies of spare parts lists for all items being furnished under this contract. Lists to indicate vendor's recommendations as to parts which should be carried in stock.

14. <u>Consultant's Participation</u>

The "Consultant" referred to throughout the documents is designated by the Owner to act in his behalf in matters pertaining to the implementation of the work on this project. The Consultant's duties or responsibilities are as outlined below.

a. Prepare the "Invitation for Bid."

b. Solicit, receive, examine, and evaluate bids as to responsiveness.

c. Participate in negotiations in the establishment of a "Procedure Manual" for administration of project, including scheduling, construction procedures, inspection, reporting, approval of drawings and other matters pertaining to the proper administration of the project.

d. Review Contractor's layouts, designs, and equipment selection for compliance with contract documents. The methods and manner of performing the work required to comply with the contract shall remain the sole responsibility of the Contractor and shall not be the responsibility of the Owner or Consultant except insofar as, in the opinion of the Consultant, the method and manner of performing the work will result in noncompliance with or a variation from the requirements of the contract documents.

e. Inspect job site to assist Owner in monitoring construction progress and review Contractor's performance.

f. Inspect the major pieces of equipment during fabrication and prior to shipment.

g. Review Contractor's invoices for payment at appropriate times after site and equipment inspections.

h. Assist the Owner in supervising performance tests.

i. Review Contractor's periodic reports.

15. Disposal of Construction Equipment and Materials

All Contractor-owned construction equipment and materials imported into the borrower country for use on this project under the fixed U.S. dollar portion of the contract, with the exception of items incorporated into the temporary facilities as covered in paragraph 4, shall, at the completion of the work, be removed from the borrower country or be disposed of locally in accordance to all applicable laws pertaining to import duties, taxes, etc. Contractor shall pay all applicable taxes and duties. Contractor shall give the Owner first opportunity to acquire such items.

All construction equipment and materials provided under the cost reimbursable Rupiah portion of the contract are the Owner's property and are to be transferred to the Owner at the completion of the work.

16. Construction Labor

The Contractor shall utilize labor, both skilled and unskilled, from a labor pool provided by the Owner.

Should the labor pool be inadequate so far as number and/or qualifications be concerned, the Contractor, upon concurrence and approval of the Owner, may take steps necessary to obtain or train the necessary personnel.

The Contractor may and is encouraged to utilize local subcontractor's wherever possible.

17. Procedure Manual

The Contractor and the Owner, prior to the execution of the contract, shall prepare a "Procedure Manual" mutually agreeable to both parties for the administration of the contract. The manual is to clearly set forth all procedures pertaining to payments, approvals, distribution of drawings and correspondence, reporting, accounting of cost reimbursable Rupiah portion of contract, and any other matters necessary for the execution of the contract in an efficient expeditious manner.

18. <u>Receiving, Unloading, Checking and Storing of Equipment and Material</u>

a. Receiving and Unloading:

(1) Contractor shall receive and unload materials promptly upon arrival to avoid delay and consequently tie up of dock or rail facilities.

(2) Contractor shall pay for all charges such as damage resulting from his failure to promptly unload equipment.

(3) Contractor shall acquaint himself as to the times of delivery and the delivery points and keep the Owner advised accordingly. This is especially critical on deliveries utilizing the Owner's dock.

(4) Contractor shall, in the unloading process, remove all material and equipment from the dock in an expeditious manner and shall not store or otherwise leave material or equipment on the dock unless given specific permission by the Owner.

(5) Contractor shall provide adequate personnel and proper types of unloading equipment to receive and unload all items.

b. Checking and Storage:

(1) Contractor shall, at time of delivery, inspect all material and equipment and, if any item is received in a damaged or otherwise unsatisfactory condition, immediately instigate action to repair or replace the items in question. The Contractor shall advise the Owner accordingly, and no such item shall be installed or erected without the approval of the Owner.

(2) Contractor, upon receipt, shall check all equipment and separately packaged parts against bill of lading for complete shipment and shall immediately instigate action to trace or replace missing parts. Contractor shall keep Owner advised of all such action.

(3) Contractor shall be responsible for the safety of all materials and equipment delivered to him and shall properly store and protect all items. Storage instructions of the manufacturers shall be followed where applicable.

19. Overseas Packing

All equipment is to be properly protected for overseas shipment.

20. Shop Inspection

The Contractor shall include a clause in all purchase orders providing for inspection by the Owner and Consultant of all equipment during manufacture, after final assembly, and after final overseas packing if so requested by the Owner and Consultant.

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

TECHNICAL SECTION 1

Description of Work

1.1 General:

The work under this contract consists of turnkey engineering and construction to expand the P. T. Semen Gresik (Persero) plant producing Type I Portland Cement and located at Gresik, East Java, Indonesia, by 125,000 M.T. per annum and thus increasing the total plant capacity from 375,000 M.T. to a total of 500,000 M.T. per annum.

As defined in the "General Conditions," the contract consists of two parts; a fixed price U.S. dollar part and a cost reimbursable Rupiah part.

The Contractor shall furnish labor, supervision, machinery, materials, equipment, parts, tools, supplies, transportation, logistical support (except for those specified in the documents as being furnished by the Owner) and all other items of work necessary and required to make the new facility complete in every respect and warranted to be safe, capable of the specified production, and ready for regular operation and use by the Owner. All items to be provided are to meet the source and origin requirements as stipulated in the "General Conditions."

It is the intent that all work items such as buildings, equipment and process componenets described in the specifications or depicted on the drawings are presented to show general or minimum requirements and standards of construction rather than specific design and to serve as an aid to the Contractor in developing the work covered hereunder. The Contractor will be expected to use his knowledge, experience, and judgement to design and install the most suitable facility within the limits defined in these documents.

The prime part of the work consists of a new production line consisting of a kiln with all necessary auxiliaries and new closed circuit finish grinding system consisting of a ball mill and all necessary auxiliaries. In order to attain the additional production capacity repairs, additions, alterations, and modifications are required to other portions of the plant.

The work includes the following: The area designations are those assigned at time of construction of the original plant. All existing documents are referenced accordingly.

The term "work" shall mean all necessary items including but not necessarily limited to excavation, foundations, piping, wire, motors, controls, and any other materials, equipment necessary for a complete operating unit or system.

1.1.1 Area "A" - Clay Processing Area

The Clay Processing Area consists of two wash mills each with a capacity of 35 dry metric tons per hour that yield a product at 40 per cent solids, four 30,000 cubic ft. capacity and two 78,500 cubic ft. capacity storage tanks, two 505 G.P.M. wash mill clay pumps and two 295 G.P.M. wash mill clay transfer pumps. One of the 78,500 cubic ft. tanks was installed during the last expansion but has never been used in as much as no agitator was provided and it was not piped.

Work in this Area includes:

1.1.1.1 Provide two new clay wash mill pumps to replace existing pumps.

1.1.1.2 Provide two new clay transfer pumps to replace existing pumps.

1.1.1.3 Provide new agitator for the second 78,500 cubic ft. storage tank.

1.1.1.4 Provide all necessary piping for the second 78,500 cubic ft. storage tank necessary to tie this tank into the existing system.

1.1.2 Area "B" - Primary Crushing

No new work in this Area.

1.1.3 Area "C" - Secondary Crushing

No new work in this Area.

1.1.4 Area "D" - Storage Building

Work in this Area includes:

1.1.4.1 Provide two (2) new bridge cranes to replace existing two cranes.

1.1.4.2 Investigate column and crane beam capacity and make necessary alterations or modifications, including replacement of rails if necessary.

1.1.4.3 Investigate and remedy the cause of excessive wear on existing crane rails and wheels.

1.1.4.4 Additions and modifications as required to tie new kiln and grinding facility into the existing storage building.

1.1.5 Area "E" - Mill Area

At the present time there are seven 8' diameter by 36' long ball mills each driven by a 1,000 horsepower motor. Three of the mills are wet grinding mills for raw material and three mills are finishing grinding mills. One of the mills is a swing mill which may be used for either raw grinding (wet) or finish grinding (dry), and it is possible to operate four (4) mills for wet grinding and three mills for dry grinding or vice versa. The dry grinding systems are closed circuit; the wet grinding systems are open circuit. Each wet mill is provided with

two pumps (one operating and one spare) for transport of slurry to correction tanks. To meet the requirements of the expanded facilities, it will be required to operate four (4) mills for wet (raw) grinding and the three (3) remaining mills plus a new mill for dry (finish) grinding.

Work in this Area includes:

1.1.5.1 New 43.6 metric tons/hour closed circuit dry grinding system capable of receiving clinker from the storage pile processing and depositing finished product into the three stockhouses.

New mill to be trunnion drive instead of integral drive as the existing mill.

System is to include all necessary auxiliaries such as hoppers, feeders, conveyor, separator, elevator, dust collector, F-K pumps, F-K compressor, etc.

1.1.5.2 Conversion of four wet (raw) grinding mills from open to closed circuit grinding. Work to include upgrading of raw material feed system to accommodate increase in capacity.

1.1.5.3 Provide interconnecting bypass prior to existing two F-K transport pumps and two new F-K transport pumps so that either set of pumps can be used to transport the cement from any of the mills.

1.1.5.4 Modifications to storage building and stockhouses necessary to tie in new grinding system.

1.1.5.5 Provide new extension to mill building necessary to house new system.

1.1.6 Area "F" - Correction Tanks

The slurry blending system consists of twelve 36' diameter by 30' high correction tanks, two 50' diameter by 40' high blending tanks, and one 80' diameter by 30' high blending tank. Slurry is pumped through an interconnected piping system by means of three transfer pumps and three slurry feed pumps.

Work in this Area includes:

1.1.6.1 Provide four (4) 36' diameter by 30' high correction tanks complete with agitators.

1.1.6.2 Tie new tanks into existing piping and pumping system.

1.1.6.3 Provide two (2) new slurry transfer pumps of increased capacity to replace existing pumps.

1.1.6.4 Provide three (3) new slurry feed pumps to replace existing pumps. Retain one of the existing units for a spare. Provide new variable speed slurry pump for new kiln.

1.1.6.5 Provide access road on west side of new correction tanks to Area "T" - Water Treatment. The new correction tanks will be located on the existing dirt access road. The bank is to be cut back and a new dirt road with drainage ditches is to be provided. Road is to be a minimum of 15 feet wide.

1.1.6.6 Relocate piping and conduit passing through area to be occupied by four new tanks.

1.1.7 Area "G" - Kiln Feed Building
Area "H" - Kiln
Area "J" - Cooler and Burner Building

The present plant has three parallel 125,000 M.T. per year production lines consisting of a kiln and all necessary auxiliary equipment. Each kiln has a capacity of 16.7 metric tons per hour of ASTM Type I Clinker.

The work in these Areas includes:

1.1.7.1 Installation of a complete 125,000 M.T. per year clinker burning facility similar to the existing three units except for the following:

1.1.7.1.1 Modify the dust return system for the collectors, dust chambers, and dust hoppers by installing dust mixing and pumping system or systems for handling the dust produced by four (4) kilns. Dust slurry is to be pumped to feed tanks or by means of bypasses directly back to the kiln feed.

1.1.7.1.2 Provide for the new kiln and existing three kilns heat exchanger systems utilizing waste heat at the burning end of the kilns for preheating the firing oil. Tie oil system into existing day tank system.

1.1.7.2 Relocate the two boilers used to heat the oil for Kiln Nos. 1, 2, and 3. These are currently located at the site of the new cement cooler.

1.1.7.3 Move the concrete block wall at Kiln No. 3 to the edge of Kiln No. 4 to increase the storage area for refractories and spare parts.

1.1.7.4 Provide new kiln feed building, kiln drive building and cooler burner building and relocate and modify as necessary the existing fuel heating boiler house.

1.1.7.5 Additions and modifications as required to the new kiln into the existing stack.

1.1.7.6 Provide second catwalk between Kilns No. 3 and No. 4.

1.1.7.7 Provide automatic centralized lubrication system for all four coolers.

1.1.8 Area "K" - Packhouse and Cement Storage

Work in this Area includes:

Provide F-K cement transport system consisting of F-K pump, compressor, and pipe lines for transporting cement from either stockhouse at Packhouse #1 to Packhouse #2. Pipe line is to be run overhead.

1.1.9 Area "L" - Paper Bag Manufacturing Building

No new work in this Area.

1.1.10 Area "M" - Power Plant

At the present time there are seven 1,500 kw. generating units at the plant with a capacity of 10,500 kws. One of the generators is in need of repair. The capacity of the generators when in good repair is sufficient for present needs. Power for the new expansion is not to be generated but purchased from a local utility. The present plan calls for only the expansion power to be purchased; but by 1973, power for

the entire plant is to be purchased. The utility company shall furnish a substation and breakers located approximately 200 meters from the powerhouse.

In addition to power generation, the powerhouse also houses five air compressors; two (2) 100 psi and three (3) 40 psi compressors. These are located on the operating floor.

Work under this Area includes:

1.1.10.1 Extending the power supply from the utility substation to the existing power plant and terminating the power supply in new switchgear consisting of new breakers and synchronizing bus so that the utility company power and generator may be paralled to increase or decrease power loads. The power supply line is to be sized for full plant capacity and not just the expansion requirement.

1.1.10.2 Provide new compressor house.

1.1.10.3 Install one (1) new 100 psi plant air compressor in new compressor house.

1.1.10.4 Relocate five existing compressors from existing power plant to new compressor house.

1.1.10.5 Rehabilitate damaged diesel generators by installing new block furnished by Owner.

1.1.10.6 Locate all possible electrical gear in power plant.

1.1.11 <u>Area "N" - Fuel and Diesel Oil Storage</u>

Work under this Area includes:

1.1.11.1 Provide pump for pumping oil from day tank to the new kiln.

1.1.11.2 Provide two new pumps at tank farm for pumping kiln fuel oil from tank farm to day tanks.

1.1.12 Area "P" - Laboratory and Office

Work under this Area includes:

Provide one (1) automatic telephone exchange with 100 numbers to be interconnected with existing unit.

1.1.13 Area "Q" - Machine Shop and Warehouse

No new work in this Area.

1.1.14 Area "R" - Grease and Lube Oil Storage

No new work in this Area.

1.1.15 Area "S" - Change House

No new work in this Area.

1.1.16 Area "T" - Water Purification Plant

No new work in this Area.

1.1.17 Area "Y" - Yard and Quarry

Work in this Area includes:

1.1.17.1 Substation No. 2:

Substation No. 2, located at the west end of the storage building, is subject to flooding. This substation is to be raised above flood level.

1.1.17.2 Existing 2,400 Volt Cable:

The three existing 2,400 volt electrical cables between the power plant and Substation #3 have badly deteriorated and are to be replaced.

1.1.17.3 New Yard Equipment:

The Contractor is to provide the following items of equipment. The Contractor may use this equipment during construction. Such equipment shall be inspected and repaired and in good working order prior to delivery to the Owner at completion of the work.

1.1.17.3.1 Two - Clay Trucks

1.1.17.3.2 One - Track Mounted Crane

1.1.18 General

All existing buried or overhead pipe lines, electrical power lines, etc., located in the areas of the new work and obstructing the new work shall be removed, modified, or relocated.

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

TECHNICAL SECTION 2

Work by Owner

2.1 The Owner, in connection with this contract, shall provide the following material, work or services:

2.1.1 Clear work areas of stored operating materials supplies and equipment.

2.1.2 Remove the existing Change House in the kiln area and the shed type buildings in the area of the new correction tanks.

2.1.3 Provide the Contractor the following materials and services as covered in Article VIII of the "Contract Form" and in the "Special Conditions."

2.1.3.1 Housing for Contractor's U.S. source and origin personnel in residence at the job site

2.1.3.2 Cement

2.1.3.3 Concrete aggregates

2.1.3.4 Lumber

2.1.3.5 Nails

2.1.3.6 Building brick and concrete block

2.1.3.7 Construction electric power, water, and compressed air

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

TECHNICAL SECTION 3

Site Work

3.1 General:

The Contractor shall provide all necessary equipment, labor, material, supervision, and incidentals for all work in connection with the existing site and facilities necessary and required by the new work.

3.2 Scope of Work:

The Contractor shall:

3.2.1 Remove, relocate, or modify existing utilities, services, structures and other obstructions located at the proposed work sites and interferring with the new work.

3.2.2 Patch, repair, or replace existing structures and facilities cut, removed, modified or damaged in connection with the new work.

3.2.3 Provide access to portions or areas of the plant blocked by the new work.

3.2.4 After completion of work such as foundations, buried utilities, services, etc., backfill all excavations, grade the area, and dispose of excess material.

Backfill material shall be clean granular material or a mixture of broken rock and sandy material in proportion to allow thorough compaction. Rock used in such backfill shall be small enough in size to avoid bridging and produce a void free fill

3.2.5 Grade for drainage the areas adjacent to new work to provide drainage into the existing open ditch system.

3.2.6 Remove the two existing oil heating boilers, including salvageable portions of the building and reinstall in a new location complete with building and all necessary auxiliaries to provide for complete operating units.

3.2.7 Conduct, prior to start of design, soil exploration in accordance to Section 5 - Structural.

3.3 Work by Owner:

Owner shall do such site work as defined in Section 2 - Work by Owner.

3.4 Fence:

The existing plant is surrounded by a perimeter security fence. Fencing other than temporary fence necessary for protection of Contractor's work and material is not required.

3.5 Construction Roads and Accesses:

All work sites are accessible from existing plant roads. No new construction roads are required.

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

TECHNICAL SECTION 4

Architectural

4.1 General:

The Contractor shall provide all engineering, design, procurement, labor, tools for the fabrication, installation or construction of the architectural items for the project. Materials of construction shall duplicate or match the existing materials and/or design.

4.2 Building Additions:

Sizes as listed are approximate and are on the same basis as existing facilities. Final sizing and layout is the responsibility of Contractor.

4.2.1 Area "E" - Mill Area:

4.2.1.1 Size - 36'-0"± (two 18'± bays) Addition to Existing Finish Mill.

4.2.1.2 Foundation - Concrete Footing.

4.2.1.3 Frame - Structural Steel.

4.2.1.4 Roof - Corrugated Asbestos.

4.2.1.5 Siding - Corrugated Asbestos and Corrugated Translucent Fiberglass Panels.

4.2.1.6 Floors - Concrete Ground Slab, Steel and Grating Platforms.

4.2.1.7 Miscellaneous - Rain Shields over Wall Openings

4.2.1.8 Ventilation - Continuous 60" Galbestos Ridge Ventilator and Wall Openings.

4.2.2 Area "G" - Kiln Feed Building:

4.2.2.1 Size - 35'-8"± (two 17'-10"± bays) Addition to Existing Kiln Feed Building.

4.2.2.2 Foundation - Concrete Footing.

4.2.2.3 Frame - Structural Steel.

4.2.2.4 Roof - Corrugated Asbestos.

4.2.2.5 Floors - Concrete Ground Slab, Steel and Grating Platforms.

4.2.2.6 Ventilation - Wall Openings Near Roof.

4.2.2.7 Miscellaneous - Lift Beam for Hoisting Equipment or Material. Rail Shields over Wall Openings.

4.2.3 Area "H" - Kiln Drive Building:

4.2.3.1 Size - 36'-0"± Extension to Existing Kiln Drive Building.

4.2.3.2 Foundation - Concrete Footing.

4.2.3.3 Frame - Structural Steel.

4.2.3.4 Roof - Corrugated Asbestos Roof to have Overhang to Protect from Driving Rain.

4.2.3.5 Siding - None.

4.2.3.6 Floors - None except for Walkways Around and Connecting Kiln Pier.

4.2.4 Area "J" - Cooler and Burner Building:

4.2.4.1 Size - 36'-0"± (two 18'-0"± bays) Extension to Existing Building with Concrete Block Control Room.

4.2.4.2 Foundation - Concrete Footing.

4.2.4.3 Frame - Structural Steel.

4.2.4.4 Roof - Corrugated Asbestos.

4.2.4.5 Siding - Lower Portion - Concrete Block
Upper Portion - Corrugated Asbestos, Translucent Fiberglass and Galbestos Louvers.

4.2.4.6 Floors - Concrete Ground Slab and Supported Concrete Slab.

4.2.4.7 Ventilator - Galbestos "Q" Type.

4.2.5 Area "M" - Compressor House:

4.2.5.1 Size - Approximately 45'-0" x 25'-0" x 15'-0" High (New Building).

4.2.5.2 Foundation - Concrete Footing.

4.2.5.3 Frame - Structural Steel

4.2.5.4 Roof - Corrugated Asbestos.

4.2.5.5 Siding - Corrugated Asbestos, Translucent Fiberglass, Galbestos Louvers.

4.2.5.6 Floors - Concrete Ground Slab

4.2.5.7 Ventilation - Galbestos Louvers.

4.2.6 Fuel Heating Boiler House: (To Be Relocated)

4.2.6.1 Size - 22'-8" Wide x 33'-0" Long x 11'-6" High.

4.2.6.2 Foundation - Concrete Footing.

4.2.6.3 Frame - Structural Steel.

4.2.6.4 Siding - Partially Concrete Block and Partially Corrugated Asbestos.

4.2.6.5 Floors - Concrete Ground Slab.

4.2.6.6 Ventilation - Galbestos Louvers.

4.3 Gutters and Downspouts:

Gutters and downspouts shall be provided for all new building additions. Details shall approximate the existing so far as possible. Downspouts to discharge onto splash blocks at grade. Areas adjacent to buildings to be graded and ditched to facilitate the removal of water.

4.4 Roofing and Siding:

4.4.1 Roofing and siding materials shall be corrugated asbestos and translucent fiberglass matching the existing materials.

4.4.2 Roofing and siding systems shall be complete with all necessary closure strips, corner closures, rake closures, flashing, calking and sealing compounds. Fasteners shall be 304 stainless steel.

4.5 Windows:

Shall be intermediate projected steel sash with white bronze hardware for hand operation. Windows shall come complete with heavy galvanized finish, bonderized for field painting, and vinyl plastic weatherstripping.

4.6 Doors and Frames:

4.6.1 Man Doors (Hollow Metal):

Shall be full flush seamless heavy duty construction, 1 3/4" thick, with sound deadening insulation and louvers where required. Heavy duty, bonderized, and shop primed.

Hollow Metal Frames:

Shall be pressed metal, 18 gauge minimum complete with adjustable jamb anchors and rubber or vinyl silencers. Frames shall be heavy duty galvanized, bonderized and prime painted, reinforced for hardware and shall bear suitable UL labels, where required.

4.6.2 Truck Doors:

Shall be industrial sliding type doors similar to existing, reinforced for heavy duty traffic. Doors shall be installed with complete hardware. All components shall be heavy duty galvanized.

4.7 Glass and Glazing:

Shall be double strength B or 1/4" thick clear polished wire glass, as required. Glass shall be set in glazing compounds with galvanized metal spring glazing clips and shims as required.

4.8 Finish Hardware:

Shall be heavy duty type or approved equal. Locks shall be from one supplier, master keyed, having two (2) submaster systems. Where required on exterior doors, aluminum threshold shall be provided. Key to match existing.

4.9 Louvers and Ventilators:

Shall be protected metal material to match siding panels; louvers and ventilators shall be complete with neoprene gaskets or protected metal closures. Existing units are Galbestos.

4.10 Miscellaneous Metal:

Platforms, walkways, stairs, ladders, lintels, door frames, curb angles, handrail, toe plate, foundation inserts, miscellaneous equipment supports, etc., shall be provided as required and shall be of Standard A-36 steel.

Grating and stair treads shall match or be similar to the existing type.

4.11 Masonry:

Concrete block shall be size provided by Owner. All work shall be laid plumb, true to line, with level and accurately spaced courses in common bond. Rubber control joints and heavy duty galvanized reinforcing or metal ties shall be used as required.

4.12 Masonry Mortar:

4.12.1 One (1) part - Portland Cement (ASTM C-150),

One (1) part - Lime Putty (ASTM C-91),

Six (6) parts - Sand (ASTM C-144),

OR

4.12.2 One (1) part - Masonry Cement (ASTM C-91),

Three (3) parts - Sand (ASTM C-144).

4.13 Painting:

Protective Coatings:

All materials and equipment subject to rusting, corrosion, etc., provided with protective coatings during shipment to the job site. Protective coatings shall be compatible with finish coats or shall be removed and surfaces primed before application of finish coats. Before application of finish coats, all rust, scale, abrasions, scratches, or other blemishes shall be removed by cleaning to bare metal and primer coated with the identical primer.

All metallic surfaces shall receive two finish coats. Machinery shipped with finish coats need not be repainted except for touch-up of scratched or blemished areas. Surfaces subject to high temperatures shall be painted with the appropriate type of paint.

All coatings to be suitable for hot, humid tropical climatic condition.

Colors shall be approved by Owner.

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

TECHNICAL SECTION 5

Structural

5.1 General:

5.1.1 Scope:

This section covers the design requirements for structural steel and concrete. All specifications, standards, codes, etc., referred to and designated herein, together with all addenda, revisions, and supplements, shall be considered parts of this specification. Specifications referred to shall be the latest revision.

5.1.2 Codes:

The design, fabrication and construction of all structures shall be governed by the applicable provisions of the Uniform Building Code, as adopted by the International Conference of Building Officials, except that structural steel and concrete shall be in accordance with the following codes:

5.1.2.1 American Institute of Steel Construction (AISC) Specification for the Design, Fabrication, and Erection of Structural Steel for Building.

5.1.2.2 American Concrete Institute Building Code Requirements for Reinforced Concrete (ACI-318).

5.1.2.3 United States Standard (formerly American Standard) Buildings' Code Requirements for Minimum Design Loads in Buildings and Other Structures (A-58 1) for all loads not Specifically called out hereafter

5.1.2.4 American Welding Society (AWS) Standard Code for Arc and Gas Welding in Building Construction.

5.2 Design Criteria:

5.2.1 Design Loads:

Design loads shall be in accordance with the Uniform Building Code except as otherwise noted herein.

5.2.1.1 Floor loads:

Burner building supported floors - actual equipment load or 400 psf.

All other supported floors - actual equipment load or 125 psf.

Platforms, walkways, and stairways - 100 psf.

5.2.1.2 Roof load:

Roof live load - 20 fsf.

5.2.1.3 Seismic loads:

Seismic load based on Zone 2 as established by the Uniform Building Code.

5.2.1.4 Wind loads:

Wind loads shall be determined by using Section 4, Chapter 1, of the design manual, "NAVDOCKS DM-2," Department of the Navy, Bureau of Yards and Docks.

Design wind velocity shall be _____.

5.2.1.5 Impact and vibratory loads:

5.2.1.5.1 Motors, fans, pumps and similar balanced rotating equipment.

Vertical Impact = 25% of weight of equipment.

5.2.1.5.2 Pan feeder supports - live load is weight of fan plus 25% of burden above pan in hopper.

Horizontal and Vertical Impact = 25% of live load.

5.2.1.5.3 Reciprocating compressors - loads and impact factors as specified by manufacturer.

5.2.1.5.4 Kiln - loads and impact factors as specified by manufacturer.

5.2.1.5.5 Ball mill -

Vertical Impact = 100% of weight of mill plus live load

Transverse Moment = as specified by manufacturer

Longitudinal Thrust = 20% of vertical load plus impact.

5.2.1.5.6 For vibrating screens, reciprocating compressors and machinery subject to unbalanced forces, amplification due to possible resonance shall be investigated.

5.2.1.5.7 Crane loads - crane loads per AISC

5.2.2 Building Foundation Design Conditions:

Building foundations shall be designed for the following conditions.

5.2.2.1 DL + LL (including impact).

5.2.2.2 DL + LL + wind or seismic (including impact.

5.2.2.3 DL + wind or seismic

5.2.3 Soils Exploration and Foundation Design:

Foundation design is to be based on soils exploration and reports obtained by the Contractor after award of contract. For purposes of the bid, all foundations are to be based on a gross soil pressure of 6 kips/sq. ft. Adjustments based on the unit prices listed in the proposal form shall be made to the contract should the soils exploration indicate deviations from the above listed condition. The cost for all necessary engineering to cover foundation design is to be included in fixed U.S. dollar price.

5.2.4 Correction Tank Design:

Correction tank design is to be based on the following.

5.2.4.1 Minimum concrete compressive strength of 4,000 psi at 28 days.

5.2.4.2 Allowable steel ring tensile strength of 20,000 psi.

5.2.4.3 Wall thickness should be designed for combined ring tension and shrinkage to keep cracking at a minimum.

5.2.4.4 Care should be taken to avoid cold joint in tank.

5.2.4.5 Slurry Density = 1.48.

5.2.5 Structural Steel:

5.2.5.1 Allowable stresses:

5.2.5.1.1 Structural steel allowable stresses shall be in accordance to "AISC Specification for Design, Fabrication, and Erection of Structural Steel for Buildings."

5.2.5.1.2 Anchor bolts shall have a maximum allowable tensile stress of 16,000 psf based on the root area.

5.2.5.1.3 For base plate design, the maximum allowable bearing stress for concrete shall be in accordance to ACI Code 318-63.

5.2.5.2 Material:

5.2.5.2.1 Structural steel shall be in accordance to ASTM A-36.

5.2.5.2.2 High strength bolts shall be in accordance to ASTM A-325.

5.2.5.2.3 Machine bolts shall be in accordance to ASTM A-307.

5.2.5.2.4 Anchor bolts shall be in accordance to ASTM A-307.

5.2.5.3 Connections:

5.2.5.3.1 Connections shall be designed for the maximum strength of members compatible with their sections, lengths, and types of stress to which they are subjected.

5.2.5.3.2 All bolted field connections shall develop the strength of an equivalent riveted connection.

5.2.5.3.3 Field connections not an integral part of the bracing system such as purlins and girts may be bolted with machine bolts as may ladders, ladder cage, hoops, handrail posts, stair stringers, removable members, pipe support members, etc.

5.2.5.4 Reports:

The Contractor, if so requested by the Owner, shall furnish the following:

5.2.5.4.1 Mill test reports or certificates of primary strength materials.

5.2.5.4.2 Welding procedure specifications and their qualification test results.

5.2.5.4.3 Welding operator's qualification test results.

5.2.5.5 Painting:

Painting shall be in accordance with Section 4, Architectural

5.2.6 Concrete:

5.2.6.1 General:

All concrete work shall conform to the latest ACI Standards.

5.2.6.2 Portland cement:

Portland cement shall conform to the standard specifications of the ASTM C-150. The Contractor shall furnish Engineer with one copy of certified mill test report for each delivery of cement. Cement shall be Type I.

5.2.6.3 Reinforcing steel:

Concrete reinforcement shall be in accordance with the latest ACI Standards. Reinforcing bars shall be intermediate grade, deformed, new billet steel per ASTM A-615, "Billet Steel, Deformed Bars," Grade 40. Wire fabric or slab reinforcement shall be new, clean, cold drawn, welded wire per ASTM A-82 or A-185.

5.2.6.4 Aggregate:

Coarse aggregate shall be composed of hard durable rock or gravel free from shale or decomposed pieces, uniformly graded, and shall be uncoated and clean conforming to the standard specifications of the ASTM C-33.

Fine aggregate shall consist of natural sand, manufactured sand, or a combination thereof, conforming to the standard specifications of the ASTM C-33.

5.2.6.5 Water:

Water used in mixing concrete shall be clean and free from injurious amounts of oils, acids, organic materials, alkalis, or other deleterious substances.

5.2.6.6 Admixture:

Certain admixtures may be added to the concrete with the written permission of the Owner.

5.2.6.7 Joint material:

Construction and slab joint material shall conform to applicable specifications of ASTM D-1751 and D994. "Preformed Expansion Joint Fillers for Concrete."

5.2.6.8 Joint sealer:

Concrete joint sealer shall conform to the standard specification of ASTM D-1190. "Concrete Joint Sealer" hot poured elastic type. Precautions in use and application shall conform to prescribed instructions of the ASTM Specification Appendix.

5.2.6.9 Strength of concrete:

The concrete for the job shall have a 28-day minimum compressive strength of 3,000 psi.

In mix design, ACI "Recommended Practice for Selecting Proportions for Concrete" shall be followed.

Slump and maximum size of aggregate shall be within the limits shown and tested in accordance with ASTM specifications.

Maximum Aggregate	Type Constr.	Slump Inches Max.	Min.
1 1/2"	Reinforced Fdn. Walls & Footings	4	2
3/4"	Slabs (not on grade), beams, cols. and Reinforced Walls	5	3
1 1/2"	Pavement over 12" thick & Flr. Slabs on Grade	4	2

5.2.6.10 Quality of concrete:

For all the concrete work, the Contractor shall adhere to the following ACI Standards: Recommended Practice for Measuring, Mixing and Placing Concrete.

5.2.6.11 Concrete tests:

5.2.6.11.1 The testing of concrete shall be the responsibility of the Contractor.

5.2.6.11.2 Four (4) cylinders, 6" dia. x 12" long, shall be taken from each day's pour or from every 150 cu. yds. of concrete, whichever gives the larger number of cylinders.

5.2.6.11.3 Specimens shall be made and cured in accordance to ASTM C-31, using standard moist curing in accordance with Sections 9a & b of Method C-31.

5.2.6.11.4 Cylinders shall be tested by a certified testing laboratory acceptable to the Owner. Tests shall be in accordance with ASTM Specification C-39; one cylinder at 7 days, two at 28 days, and one spare.

5.2.6.12 Defective material:

5.2.6.12.1 If concrete test cylinders do not meet the strength requirements as specified in paragraph or do not fully conform to these specifications, the concrete shall be considered defective material.

5.2.6.12.2 If, in the opinion of the Owner, the defective material is detrimental to the design integrity of the structures, the repair shall be at the Contractor's expense.

5.2.6.12.3 Cores that may be required in the event test cylinders are below specified strength shall be made, as directed by the Owner.

5.2.6.13 Surface finish:

5.2.6.13.1 All exposed surfaces shall have form marks and fins carefully removed. Rough spots on surfaces shall be rubbed smooth with carborundum stone and water and shall be uniform in color with adjacent finished area.

5.2.6.13.2 Supported concrete floors and slabs on grade in enclosed areas shall receive steel trowel finish.

5.2.6.14 Curing:

Concrete shall be cured by keeping it moist for at least seven days after placing. Moisture may be returned or provided by spraying with curing compound or by sealing with paper or plastic or by covering with an appropriate material such as canvas or burlap and sprinkling at necessary intervals. All other conditions consistent with good practice to insure the development of the required strength shall be taken.

5.2.6.15 Hot Weather Precautions:

The mixing, placing and curing of the concrete during hot weather shall be done in accordance with the applicable requirements of the ACI Standard, "Recommended Practice for Hot Weather Concreting" (ACI 605).

5.2.6.16 Grout:

Grout may be poured or placed by the "Dry Pack" method.

5.3 Structural Excavation:

Excavation shall not be made below bottom of foundation except where material is unsuitable for supporting the imposed loads. Overexcavated areas shall be backfilled with lean 4 sacks per cubic yard concrete.

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

TECHNICAL SECTION 6

Piping

6.1 General:

Scope:

The Contractor shall design, furnish, and install all piping or piping systems required for the work under these contract documents.

Work under this section includes furnishing and installing all necessary hangers, supports, slides, guides, beam clamps, hangers, turnbuckles, bracing, rolls, plates, brackets, saddles, supports and any other necessary auxiliaries required for installation of complete piping items or systems.

The work includes but is not necessarily limited to the services as listed in the piping index.

6.2 Codes:

All work under this section is to be done in accordance with all applicable codes.

6.3 Reference to Manufacturer's Name:

Where products are specified by manufacture, brand name, catalogue number, such designation is to establish standards of desired quality and style and any such designation should be understood to mean "or approved equal."

6.4 Sleeves:

Standard weight pipe sleeves shall be provided for pipe passing through concrete walls and floors. Sleeves through floors shall be flush with bottom and extend

6" above floor. Sleeves through walls shall be flush with wall on each side.

6.5 Valves:

Valves shall be provided wherever necessary for proper operation and/or maintenance.

All valves shall be accessible to operating personnel without the need for portable ladders, stairs, etc. The Contractor is to provide all necessary permanent platforms, stairs, etc.

6.6 Piping Location:

All process type piping such as air, slurry, etc., is to be run exposed overhead so far as practical.

6.7 Pipe Supports and Anchors:

All above ground piping shall be properly supported by suitable structural steel supports. All piping supports shall be satisfactorily cross braced and such bracing shall not interfere with passageways. Sufficient suitable anchors, guides, graphite pipe slides and other provisions for expansion of pipe lines shall be provided. All lines shall be anchored so that stresses due to expansion will not be transmitted to equipment connections.

6.8 Drain Connections:

Drain connections shall be provided at low points of lines for draining or flushing of lines.

6.9 Hydrostatic Tests:

Hydrostatic tests shall be made on pipe lines in accordance with applicable codes or in accordance with standard practice.

6.10 Connections to Equipment and Tanks:

All piping shall be installed and supported in a manner that will put no strain on the equipment or tanks.

6.11 Flushing and Cleaning:

All pipe lines upon completion of erection shall be thoroughly flushed clean.

Flushing and cleaning of oil lines shall be in accordance with the specification for that service.

6.12 Insulation:

6.12.1 Steam:

Steam lines shall be insulated in accordance with the insulation specification.

6.12.2 Oil and Condensate:

Oil and condensate lines shall be insulated for personnel protection only in accordance with the insulation specification.

PIPING SPECIFICATION INDEX

Aboveground

	Material Spec.
Plant Water	1
Cooling Water	1
Treated Water	12
Boiler Feedwater	2
Slurry	12
Plant Air	1
Mixing Air	1
Starting Air (Diesel Generator Installation)	5
Low Pressure Air for Air Slides	1
Air F-K Compressor to Pump	1
Instrument Air (Headers)	3
Instrument Air (Branches)	4
Fuel Oil	6
Lubricating Oil	6
High Pressure Oil for Trunnion Lift	7
Steam	2
Condensate	2
Boiler Chemical Feed	8
Downspouts and Floor Drains	9
	11

Underground

Plant Water	11
Treated Water	11
Storm Sewers	10

Insulation

All Services	13

PIPING

Material Specification No. 1

Construction:	2" and under - screwed. 2 1/2" and over - welded.
Pipe:	2" and under - Schedule 40 ERW or seamless steel, ASTM A-53, Grade B, plain ends. 2 1/2" thru 10" - Schedule 40 ERW or seamless steel, ASTM A-53, Grade B, beveled ends. 12" thru 24" - 0.375" wall ERW or seamless steel, ASTM A-53, Grade B, beveled ends.
Fittings:	2" and under - 150# malleable iron, screwed. 2 1/2" thru 24" - carbon steel, standard weight, butt weld, ASTM A-234, Grade B.
Flanges:	150# ASA standard slip-on or weld-neck forged steel, ASTM A-181, Grade 1, flat face.
Unions:	2" and under - 300# malleable iron, screwed, ground joint, bronze to iron seat. WALWORTH #7716.
Gaskets:	1/8" thick red rubber compound. Full face. GARLOCK #22.

PIPING

Material Specification No. 1 (Cont'd.)

Bolts: Hex head machine bolts, carbon steel conforming to ASTM A-307, Grade B. Thread to ASA coarse thread standard B1.1 with heavy semi-finished hex nuts.

Gate Valves: 2" and under - 150# bronze, screwed, solid wedge, I.S.R.S. union bonnet.

CRANE	431-UB
WALWORTH	11
POWELL	2714S

2 1/2" thru 24" - 125# iron body, bronze trim, wedge gate, O.S. & Y., flanged.

CRANE	465 1/2
WALWORTH	726F
POWELL	1793

Globe Valves: 2" and under - 200# bronze, screwed, union bonnet.

CRANE	70
WALWORTH	160
POWELL	110

2 1/2" thru 12" - 125# iron body, bronze trim, flanged. Yoke bonnet.

CRANE	351
WALWORTH	906F
POWELL	241

Check Valves: 2" and under - 200# bronze, screwed, swing check, bronze disc regrinding.

CRANE	36
WALWORTH	420
POWELL	560Y

PIPING

Material Specification No. 1 (Cont'd.)

2 1/2" and over - 125# iron body, bronze trim, Style "B".
MISSION Duo-Chek, Fig. #12 HMP

Butterfly Valve: (Air Slides Only) 1" thru 4" cast iron, ROCKWELL, Class BT-4, screwed.

NOTE NO. 1 Underground pipe and fittings, using Material Spec. No. 1, are to be coated and wrapped. Globe and Check Valves underground are to be installed in valve pits.

PIPING

Material Specification No. 2 (Cont'd.)

Construction:	2" and under - socket welded. 2 1/2" and over - welded.
Pipe:	2" and under - Schedule 40, welded steel, ASTM A-53, plain ends. 2 1/2" thru 10" - Schedule 40, welded or seamless steel, ASTM A-53. Beveled ends. 12" and over - 0.375" wall welded or seamless steel, ASTM A-53, beveled ends.
Fittings:	2" and under - 2000# forged steel, socket weld. 2 1/2" and over - carbon steel standard weight butt weld. Elbows to be long radius type.
Branch Connections from Welded Run:	2" and under - 3000# forged steel coupling. 2 1/2" and over - use tees or fabricate from pipe if branch connection is at least two (2) nominal sizes smaller than the run.
Flanges:	150# ASA slip-on carbon steel, ASTM A-181, Grade 1. Face to suit mating.
Unions:	2" and under - 3000# forged steel socket weld integral seat. W.S. Fig. 9820 SW.

PIPING

Material Specification No. 2 (Cont'd.)

Gaskets:	1/8" thick compressed asbestos, GARLOCK 7022.
Bolts:	Hex head alloy steel bolts conforming to ASTM A-193, Class B7, threaded to ASA standard B1.1-49 with heavy semi-finished hex nuts conforming to ASTM A-194, Class 2A.
Gate Valves:	1 1/2" and under - 600# forged steel A-105, Grade 11, bolted bonnet, O.S. & Y., A-182, Grade F6 trim, socket weld. EDWARDS 448Y 2" and over - 150# cast steel A-216, WCB bolted bonnet, O. S. & Y., A-182 Grade F6 trim. WALWORTH 5275F
Check Valves:	1 1/2" and under - 600# forged steel, A-105 Grade 11, bolted bonnet, piston type, Y pattern, A-182, Grade F6 trim, socket weld ends. EDWARD 838Y 2" and over - 150# cast steel, A-216 WCB, bolted cap, swing check, A-182, Grade F6 trim. WALWORTH 5341F

PIPING

Material Specification No. 3

Construction:	All sizes - screwed.
Pipe:	All sizes - Schedule 40, welded steel, ASTM A-53, galvanized, threaded and coupled.
Fittings:	All sizes - 150# malleable iron, screwed, galvanized.
Unions:	All sizes - 300# malleable iron, ground joint, bronze to iron seat, galvanized. GRABLER Fig. 14
Gate Valves:	All sizes - 125# bronze, screwed, solid wedge, I.S.R.S. WALWORTH 2
Globe Valves:	All sizes - 200# bronze, screwed, union bonnet. WALWORTH 160
Check Valves:	All sizes - 125# bronze, screwed, swing check, screwed cap. WALWORTH 406.
Ball Valves:	1/2" and 3/4" - 200# bronze screwed ball valve, chrome plated ball and stem. Buna-N covered ball. CRANE 2180

PIPING

Material Specification No. 4

Construction:	Soldered or screwed.
Pipe:	All sizes - Copper tubing, Type L, hard temper, ASTM B-88, straight lengths.
Fittings:	All sizes - wrought copper sweat type, ASTM B-75.
Unions:	All sizes - Cast bronze ground joint sweat type.
Gate Valves:	All sizes - 200# bronze screwed solid wedge, I.S.N.R.S. LUNKENHEIMER 768 STOCKHAM B-140
Check Valves:	1/4" and 3/8" - 200# bronze screwed, swing type, regrinding, horizontal. WALWORTH 420 1/2" thru 2" - 300# bronze, screwed swing type, regrinding, horizontal. WALWORTH 428
Ball Valves:	1/4" thru 2" - 400# bronze body, bronze ball, screwed. CRANE "Accesso" 2330-TF
Globe Valves:	2" and under - 200# bronze, screwed, union bonnet. WALWORTH 160

PIPING

Material Specification No. 5

Construction:	2" and under - socket welded. 2 1/2" and over - butt weld.
Pipe:	1/2" thru 10" - Schedule 40, welded or seamless steel, ASTM A-53, Grade B. 12" and over - 0.375" wall welded or seamless steel, ASTM A-53, Grade B. 2" and under - plain ends. 2 1/2" and over - beveled ends.
Fittings:	2" and under - 2000# forged steel socket weld. 2 1/2" and over - carbon steel, standard weight, butt weld. Elbows to be long radius type.
Branch Connections from Welded Run:	2" and under - 3000# forged steel coupling. 2 1/2" and over - use tees or fabricate from pipe if branch connection is at least two (2) nominal sizes smaller than the run.
Flanges:	300# ASA standard slip-on, ASTM A-181, Grade 1, face to suit mating.
Unions:	3000# forged steel, socket weld, integral seat, W-S Fig. 9820 SW.

Material Specification No. 5 (Cont'd.)

Gaskets:	Type 304 stainless steel with asbestos filler. FLEXITALLIC Style CG
Bolts:	Hex head alloy steel bolts conforming to ASTM A-193, Class B7, threaded to ASA standard B1.1-49 with heavy semi-finished hex nuts conforming to ASTM A-194, Class 2A.
Gate Valves:	2" and under - 600# forged steel, A-105, Grade II, bolted bonnet, O.S. & Y., ASTM ASTM A-182, Grade F6 trim, socket weld, Schedule 40 bore. HANCOCK 955W 2 1/2" and over - 300# cast steel, A-216 WCB, bolted bonnet, with A-182, F6 trim, weld ends for Schedule 40 pipe. WALWORTH 5206WE
Globe Valves:	2" and under - 600# forged steel, ASTM A-105, Grade II, bolted bonnet, O.S. & Y. ASTM A-182, Grade F6 trim, socket weld, Schedule 40 bore. EDWARD 848Y 2 1/2" and over - 300# cast steel, A-216 WCB, bolted bonnet, A-182 F6 trim, weld ends for Schedule 40 pipe. WALWORTH 5281WE

PIPING

Material Specification No. 5 (Cont'd.)

Check Valves:

2" and under - 600# forged steel, A-105, Grade II, bolted cap, piston type Y pattern, A-182 Grade F6 trim, socket weld ends for Schedule 40 pipe.

1/4" thru 2" - EDWARD 838Y

2 1/2" and over - 300# cast steel, A-216 WCB, bolted cap, swing check A-182, F6 trim, weld ends for Schedule 40 pipe. WALWORTH 5344 WE

PIPING

Material Specification No. 6

Construction:	5/8" and under - screwed (compression).
	3/4" thru 2" - socket weld.
	2 1/2" and over - welded.
Pipe:	5/8" and under - cold drawn seamless carbon steel, O.D. pressure tubing, .065" wall, SAE 1010 dead soft straight random lengths, pickled and annealed. Ends sealed for cleanliness.
	3/4" thru 2" - Schedule 40, welded or seamless steel, ASTM A-53, plain ends.
	2 1/2" thru 10" - Schedule 40, welded or beveled ends.
Fittings:	5/8" and under - steel compression type GYROLOK
	3/4" thru 2" - 2000# forged steel, socket weld.
	2 1/2" and over - carbon steel standard weight, butt weld. Elbows to be long radius type.
Branch Connections from Welded Run:	2" and under - fittings.
	2 1/2" and over - use tees or fabricate from pipe if branch connection is at least two (2) nominal sizes smaller than the run.

Material Specification No. 6 (Cont'd.)

Backing Rings: (lube oil only)	2 1/2" and larger - carbon steel, split type at all butt welded joints. ROBVON Type C
Flanges:	150# ASA standard slip-on carbon steel, ASTM A-181, Grade 1. Face to suit mating.
Unions:	5/8" and under - steel compression type GYROLOK 3/4" thru 2" - 3000# forged steel socket weld integral seat. W-S Fig. 9820 SW
Gaskets:	1/8" thick graphited asbestos. GARLOCK 951
Bolts:	Unfinished square head machine bolts, carbon steel conforming to ASTM A-307, Grade B, thread to ASA coarse thread standard B1.1-45 with heavy unfinished hex nuts.
Plug Valves:	1" thru 4" - 175# cast iron flanged wrench operated lubricated plug. WALWORTH 1797F 6" thru 12" - 200# cast iron flanged wrench operated lubricated plug. WALWORTH 1718F

Globe Valves:

1/2" and under - forged carbon steel, screwed, stainless steel stem.
HOKE 100 series

3/4" thru 2" - 600# forged steel, ASTM A-105, Grade II, bolted bonnet, O.S. & Y., A-182 F6 trim, socket weld. Schedule 40 bore.
HANCOCK 5520W

2 1/2" and over - 125# all iron, flanged, bolted bonnet.
POWELL 457

Check Valves:

1/2" and under - Type 303 stainless steel, screwed, piston type.
HOKE 580 series

3/4" thru 2" - 600# forged steel, ASTM, A-105, Grade II, bolted bonnet, A-182 F6 trim, Schedule 40 bore, socket weld.
HANCOCK 5540W

2 1/2" and over - 125# all iron, flanged, swing check.
POWELL 1259

Cleaning of Lubricating Piping System After Erection:

It is understood -

1. The above work shall consist of

   a. Degreasing mill scaling

   b. Neutralizing and passivating

PIPING

Material Specification No. 6 (Cont'd.)

2. The following shall be provided by the Client:

   a. Water supply sufficient for 200 GPM flushing operation.

   b. 100 psig steam supply, 1" ø pipe.

   c. Fill and return lines, 2" ø pipe, pump truck to lube oil system. All parts of the system to be cleaned shall have to be vented, unless the piping is of such size that the gases can be removed from the high points by circulating the solution at a velocity sufficient to remove the trapped gases.

3. Recommended Vendor -

   Dow Industrial Service, Division of Dow Chemical Company.

PIPING

Material Specification No. 7

Construction:	Flare type - J.I.C.
Pipe:	5/8" and under - cold drawn seamless or welded, type 304 stainless steel, ASTM A-269-58, annealed, pickled and cold drawn pressure tubing. Random lengths, ends to be sealed for cleanliness.
Fittings:	37° flare type, J.I.C. PARKER-HANNIFIN "Triple-Lok"
Unions:	Same as Fittings.
Cleaning:	After erection, the system shall be thoroughly cleaned by flushing. Flushing is to be done by pumping flushing oil through the system until the system is clean. System pumps may not be used for flushing. By-pass all relief valves, filters, control valves, bearings, etc. during flushing. By-passed items will be removed and thoroughly cleaned as directed. Inspect oil reservoirs and remove foreign matter before filling.

PIPING

Material Specification No. 8

Construction:	2" and under - screwed. 2 1/2" and over - welded.
Pipe:	2" and under - Schedule 80, welded steel, ASTM A-53, threaded and coupled. 2 1/2" thru 8" - Schedule 80, welded or seamless steel, ASTM A-53, beveled ends. 10" and over - 0.500" wall welded or seamless steel, ASTM A-53, beveled ends.
Fittings:	2" and under - 3000# forged steel, screwed. 2 1/2" and over - carbon steel, extra heavy, butt weld. Elbows to be long radius type.
Branch Connections from Welded Run:	2" and under - 3000# forged steel coupling. 2 1/2" and over - use tees or fabricate from pipe if branch connection is at least two (2) nominal sizes smaller than the run.
Flanges:	150# ASA standard slip-on carbon steel, ASTM A-181, Grade 1. Face to suit mating.
Unions:	2" and under - 3000# forged steel, screwed, ground joint, integral seat. WATSON-STILLMAN 9800 - Screwed

PIPING

Material Specification No. 8 (Cont'd.)

Gaskets: 1/8" thick graphited asbestos.
GARLOCK 951

Bolts: Unfinished square head machine bolts, carbon steel conforming to ASTM A-307, Grade B, thread to ASA coarse thread standard B1.1-45 with heavy unfinished hex nuts.

Gate Valves: 2" and under - 600# forged steel, A-105, Grade II, bolted bonnet, O.S. & Y., A-182, Grade F6 trim, screwed.
HANCOCK 950S

2 1/2" and over - 150# cast iron steel, A-216 WCB bolted bonnet, O.S. & Y., A-182 stainless steel trim, weld end.
WALWORTH 520WE-AAA

Globe Valves: 2" and under - 600# forged steel, A-105, Grade II, bolted bonnet, O.S. & Y., A-182, Grade F6 trim, screwed.

1/4" thru 1".
EDWARD 848

1 1/4" thru 2".
EDWARD 448

2 1/2" and over - 150# cast steel, A-216 WCB bolted bonnet, O.S. & Y., A-182, Grade F6 trim, butt weld ends to suit pipe.
WALWORTH 5275WE

PIPING

Material Specification No. 8 (Cont'd.)

Check Valves:

2" and under - 600# forged steel, A-105, Grade II, bolted bonnet, piston type, Y pattern, A-182, Grade F6 trim, screwed.

1/4" thru 1".
EDWARD 2678

1 1/4" thru 2".
EDWARD 4638

2 1/2" and over - 150# cast steel, A-216 WCB, bolted bonnet, swing check, A-182, Grade F6 trim butt weld ends to suit pipe.
WALWORTH 5341WE

PIPING

Material Specification No. 9

Construction:	2" and under - solder joint. 2 1/2" and over - welded.
Pipe:	2" and under - copper tubing Type DWV. 2 1/2" and over - Schedule 40, seamless steel, ASTM A-53, beveled ends.
Fittings:	2" and under - wrot drainage type solder joint DWV. 2 1/2" and over - carbon steel, standard weight butt weld. Ells to be long radius type.
Roof Drains: (metal deck)	Cloudburst roof drain - Zurn Z12 100ECR. Dura coated cast iron drain body with removable bayonet-locking aluminum mushroom dome strainer, dura coated cast iron extension sleeve, complete with under deck clamp, clamping bolts and roof sump receiver, threaded outlet.
Roof Drains: (precast concrete slab)	Cloudburst roof drains - Zurn Z12-100C. Dura coated cast iron drain body with removable bayonet-locking aluminum mushroom dome strainer, complete with under deck clamp and clamping bolts, threaded outlet.

Material Specification No. 9 (Cont'd.)

Floor Drains: Heavy-duty clear-flow floor drain, Zurn Z-505 with Duresist grade. Caulked or screwed outlets to suit.

PIPING

Material Specification No. 10

Construction:	2" thru 15" - bell and plain end. 16" and over - mechanical joint and compression.
Pipe:	2" thru 15" - extra heavy cast iron bell and plain end soil pipe conforming to Commercial Standard CS-188-59, with coal tar pitch coating. Ends suitable for use of molded Neoprene gaskets. 16" and over - centrifugal cast iron, 0 psig, 8' cover, coated only, compression type joint per WW-P-421b.
Fittings:	2" thru 15" - extra heavy cast iron bell and plain end soil pipe fittings conforming to Commercial Standard CS-188-59 with coal tar pitch coating. Ends suitable for use of molded Neoprene gaskets. 16" and over - same class as pipe with mechanical joints per ASA Spec. 21.11.
Joints:	Neoprene gasket, mechanical joint, or jute with pure lead.
Floor Drains:	Heavy-duty clear-flo floor drain, Zurn Z505 with duresist grade and caulked outlet.

PIPING

Material Specification No. 11

Construction:	Mechanical joint and compression.
Pipe:	Centrifugal cast iron. 150# class in accordance with ASA Specification A21.6 with compression type joint per WW-P-421b Specification. Factory applied coal tar pitch varnish inside and outside.
Fittings:	Cast iron ASA A21.10 with mechanical joints per ASA Specification 21.11. Factory applied coal tar pitch varnish inside and outside.
Gaskets:	Plain vulcanized crude rubber compound, smooth surface in accordance with ASA Standard 21.11.
Bolts:	High strength, heat treated cast iron or wrought iron tee-head bolts with heavy unfinished hex nuts. Bolts and nuts in accordance with ASA Standard A21.11.
Gate Valves:	200# cast iron, CW, bronze mounted, wedge gate, mechanical joint, non-rising stem with 2" operation nut. LUDLOW 503
NOTE:	For sizes under 2" - use Material Specification No. 1

PIPING

Material Specification No. 12

Construction:	Flanges, victaulic couplings and welds - flushing and pressure gauge connections are screwed.
Pipe:	Schedule 40 seamless steel, ASTM A-53, Grade B. Beveled ends.
Fittings:	Carbon steel, standard weight, butt weld, A-234, Grade B. All elbows to be long radius and are to be reinforced on the outer periphery with wear backs.
Flanges:	150# slip-on, forged steel, ASTM A-181, Grade I, flat faced.
Couplings:	Victaulic "Roust-a-bout," Style 99.
Gaskets:	1/8" thick red rubber compound, full face. GARLOCK 22, Victaulic Grade "T" for Victaulic couplings.
Bolts:	Hex head machine bolts, carbon steel conforming to ASTM A-307, Grade B. Thread to ASA coarse thread standard B1.1 with heavy hex nuts.
Pinch Valves:	125# ASA flanged, hand wheel operated, fully lined with rubber. Galigher squeeze valve, Red Valve or Clarkson Company.

PIPING

Material Specification No. 12 (Cont'd.)

Plug Valves: 175# semi-steel, short pattern. 125# flanged ends, lubricated plug, wrench operated. 3" and 4" ROCKWELL 143.

6" thru 12" - 200# semi-steel. ROCKWELL 143

Plug material for slurry conditions.

Gate Valves: For flushing connections - 200# brass hose gate valve, wedge disc non-rising stem CRANE 451

NOTES: Flow in slurry piping will maintain a line velocity of 4 to 5 feet per second. Slurry lines will be self-draining. Lines that are not self-draining will be provided with flushing connections and low-point drains and valves.

Install breakdown connections; i.e., flanges or Victaulic couplings, in slurry lines as required to facilitate cleaning.

Support piping at rubber pinch valves so that no loads will be exerted on the valve.

PIPING

Material Specification No. 13

Material:	Indoor - fiberglass with factory applied canvass jacket, snap-on type. Outdoor - fiberglass with factory applied 35# asphalt-felt jacket, snap-on type.
Minimum Thickness:	As required by design conditions.

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

TECHNICAL SECTION 7

Electrical

7.1 General:

The Contractor is to design, furnish and install all electrical items or systems necessary to provide a complete working installation that is properly protected, interlocked, and adequately controlled.

7.1.1 All materials and equipment shall be new, without defect, and shall be delivered to the site in original cartons or packages. All materials furnished shall conform to applicable standards.

7.1.2 Where materials, equipment, apparatus or other products are specified by manufacturer, brand name, type or catalogue number, such designation is to establish standards of desired quality and style and any such designation should be understood to mean "or approved equal."

7.1.3 All materials and equipment shall be suitable for use or operation in humid tropical climate.

7.1.4 All work under this section shall be done in accordance to all applicable codes.

7.1.5 Continuous temporary power shall be supplied to equipment heating elements during storage.

7.2 Description of Work:

The work shall include but not necessarily be limited to:

7.2.1 Providing temporary light and power for construction purposes in accordance with the "Special Conditions."

7.2.2 Design, furnish and install new 15KV feeder from the utility substation to new switchgear.

7.2.3 Design, furnish and install 15 KV, 500 MVA switchgear which is to be located in power house.

7.2.4 Relocate or elevate existing Substation No. 2 which is currently subject to flooding.

7.2.5 Replace existing 2,400 volt cable between power plant and Substation No. 3.

7.2.6 Design, furnish and install all necessary control, power, lighting, etc., systems necessary for all work items under these Contract Documents, including but not limited to:

7.2.6.1 Lighting systems complete with fixtures, lamps, ballasts, lighting panels, transformers, wire, conduit, fittings, and all necessary hardware as required.

7.2.6.2 Power distribution system cable and associated conduit system.

7.2.6.3 Control power distribution systems complete with distribution panels, transformers, wire, and conduit.

7.2.6.4 Grounding ties to plant system such that all 2,400 volt motors, all motors over fifty (50) HP, and all equipments such as substations, motor control centers, 2,400 volt starters, and other equipments shall have direct copper ground connections to ground loop.

7.2.6.5 Control wiring systems complete with pushbutton stations, selector switches, terminal box assemblies, wire, conduit support hangers, and miscellaneous devices for a complete operating system.

7.2.6.6 Instrumentation wiring systems complete with wire, conduit and/or tray.

7.2.6.7 Conduit, embedded and exposed; wireway and cable ladder systems as required for complete operating system. Concrete and rebar for embedded conduit to be furnished and placed under this specification.

7.2.6.8 Pull boxes, junction boxes and terminal boxes shall be installed as required.

7.2.6.9 Communications conduit system.

7.3 Electrical Apparatus:

7.3.1 15 KV Switchgear:

13,800 volt switchgear shall be indoor type, free standing, metal clad units complete with current ratings as required; three pole, 15,000 volt, 500 MVA interrupting capacity, electrically operated air circuit breakers with relaying, metering, and auxiliary control equipment as required.

7.3.2 Medium Voltage Switchgear:

2,400 volt switchgear shall be indoor type, free standing, metal clad units complete with continuous current ratings as required; three pole, 5,000 volt, 350 MVA interrupting capacity, electrically operated air circuit breakers with relaying, metering, and auxiliary control equipment as required.

7.3.3 Secondary Unit Substations:

Secondary unit substations shall be indoor, free standing, metal clad units consisting of a fused primary disconnect switch, askarel filled transformer unit, and secondary switchgear section. The primary disconnect switch will be

a 5 KV or 15 KV class fused switch. The transformer will be a three phase, 50 hertz, 13,800/460 or 2,400/460 volt unit with the capacity as dictated by distribution and loading requirements. The secondary switchgear section will consist of free standing, metal clad units complete with three pole, 600 volt class, manually operated air circuit breakers with continuous and interrupting current ratings as required, complete with metering and relaying equipment.

7.3.4 Medium Voltage Motor Controllers:

Medium voltage motor controllers will be 2,400 volt, magnetic, full voltage, non-reversing, high interrupting capacity (150 MVA at 2,400 volts) units completely assembled and wired in rigid, free standing, NEMA Type I general purpose enclosures. Each synchronous motor controller will be equipped with 1,000 ampere power bus, ground bus, line isolating switch, current limiting type power fuses, roll-out type air break contactor, thermal overload and undervoltage relaying equipment, start-stop pushbutton station, necessary complement of circuit components for precision angle field application and load angle field removal, metering equipment, and other relaying equipment, as required. Induction motor controllers will be equipped as described above with the exception of field application, control, and metering apparatus.

7.3.5 Motor Control Centers:

Motor control centers will consist of combination fusible type, across-th -line, full voltage, non-reversing, reversing or multispeed, three pole, 600 volt class, magnetic motor starters with bimetallic thermal overload devices; 120 volt control circuit transformers and necessary auxiliary contacts; fused disconnect for feeder protection; process control power transformers and distribution panelboards, and other specified and/or required components grouped, wired, and mounted in sheet steel, NEMA I or NEMA 12 general purpose enclosures.

7.3.6 Rotating Equipment:

Output ratings, current characteristics, types, torque ratings, and other features of AC and DC drive motors, variable speed drive units, motor generator sets, etc., will be as required for the particular application and service, and be in accordance with NEMA, IEEE, and ASA Standards where applicable.

7.3.7 Electrical Characteristics of Motors Shall be as Follows:

7.3.7.1 A.C. motors 200 horsepower and less shall be 460 volt, 3 phase, 50 hertz, TEFC or TENV type. All process motors shall be 3 phase.

7.3.7.2 A.C. fraction A.C. horsepower motors for non-process shall be 120 volt, 1 phase, 50 hertz, TEFC or TENV.

7.3.7.3 A.C. motors 225 horsepower and over shall be 2,400 volt, 3 phase, 50 hertz, open drip proof with sealed insulation.

7.4 Electrical Materials:

7.4.1 Rigid Conduit:

Conduit for lighting, power, and control circuit wiring shall be rigid steel or aluminum threaded, thick wall, made to the same dimensions as standard pipe, unless otherwise noted.

7.4.2 Minimum size of conduit for general use shall be 3/4 inch, fixture stems may be 1/2 inch minimum, conduit encased in concrete shall be 1 inch minimum.

7.4.3 Flexible Conduit:

Flexible conduit shall be flexible interlocked steel tubing with galvanized finish and liquid-tight protective covering. Flexible conduit shall be type U.A. with positive ground.

7.4.4 Non-metallic Conduit:

Non-metallic conduit shall be of asbestos cement composition, continuously formed.

7.4.5 Conduit Fittings - for Rigid Steel Conduit:

7.4.5.1 Conduit fittings shall be aluminum or cast ferrous metal type, having cadmium finish.

7.4.5.2 Fittings shall be threaded for use with rigid, thick wall conduit and shall be equipped with gasketed covers unless otherwise specified.

7.4.6 Conduit Locknuts and Bushings:

7.4.6.1 Conduit locknuts shall be heavy duty cast ferrous metal or aluminum.

7.4.6.2 Conduit bushings shall be fabricated or molded canvas bakelite.

7.4.7 Pull Boxes:

7.4.7.1 Junction boxes and/or terminal boxes shall be installed and sized as required by specifications or codes.

7.4.7.2 Boxes shall be gasketed equivalent to NEMA 12 for indoor use of mounting of contact making devices.

7.4.7.3 Boxes for outdoor use shall be NEMA 4, water tight.

7.4.8 Cable:

7.4.8.1 Conductors - for power distribution, lighting, motor feeders, control and instrumentation - shall be soft drawn, stranded, annealed copper as manufactured by General Electric, General Cable, Anaconda, Okonite, or approved equal.

7.4.8.2 Cable for 13,800 and 4,160 volt circuits shall consist of copper conductors, semi-conducting tapes over and under cross linked polyethylene insulation with outer jacket of color coded polyvinyl chloride and will be furnished in the following type:

7.4.8.2.1 Three conductor interlocked armored for installation in tray system.

7.4.8.2.2 Single conductor for installation in conduit.

7.4.8.2.3 Three conductor preassembled aerial for installation on poles for main feeders from utility.

7.4.8.3 Cable for 600 volt power circuits shall consist of copper conductor, code grate RHW insulation with Neoprene jacket.

7.4.8.4 Cable for 600 volt and less control circuits shall be multiple conductor in No. 14 and No. 2 AWG sizes, color coded thermoplastic insulation.

7.4.8.5 Cables for installation in high ambient temperature areas shall be code grade SRE as required by good engineering practices.

7.4.8.6 Mininum size for motor and other power circuits shall be No. 12 AWG. Minimum size for control circuits shall be No. 14. Minimum size for lighting shall be No. 12.

7.4.9 Switches and Receptacles Shall be as Follows:

7.4.9.1 Switches - for lighting circuits with bakelite bases and handles - shall be T rated, 20 amp for 120 volt and 277 volt circuits.

7.4.9.2 Receptacles shall be duplex-polarized, 3 wire grounding type for either side or back wiring rated 20 amp, 125 volt A.C.

7.4.10 Panelboards Shall be Circuit Breaker Type Consisting of:

7.4.10.1 Code gauge steel with hinged doors and directory card, NEMA 12 construction for non-ventilated, non-filtered area, surface mounted.

7.4.10.2 Lighting and control power panels shall be circuit breaker type with main lugs only.

7.4.10.3 Transformers for Lighting

Dry type for general use shall be air cooled, Class B, insulation enclosed, and provided with two 2½% taps above and two 2½% taps below primary rated voltage.

7.4.10.4 Cable Ladder and Channel

For raceways, shall conform with latest NEMA Standards on ventilated cable trays for Class III loading. All cable trays shall be hot dip galvanized (after fabrication) or aluminum with 4 inch side channels and 12 inch rung spacing.

7.4.10.5 Lighting

7.4.10.5.1 Interior lighting systems will consist of modern, properly designed luminaires employing mercury vapor, fluorescent, or incandescent lamps as required by the desired intensity, seeing task, and application. Lighting systems will be coordinated so as to include a minimum variety of luminaires and lamp types.

7.4.10.5.2 Maintained Illumination Levels shall be:

Yard Area	3FC
Ball Mill Area	30
Kiln Feed Bldg.	50
Cooler & Burner Bldg.	50
Kiln Drive Bldg.	50
Control Rooms	100

7.5 Installation:

7.5.1 General:

7.5.1.1 All work shall be installed so as to be readily accessible for operating, servicing, maintaining, and repairing.

7.5.1.2 Any items which, in the opinion of the Owner, are installed in unsuitable locations shall be removed and relocated, as directed by the Owner at no expense to Owner.

7.5.1.3 Workmanship shall be of the highest class and best trade practice but not less than the requirements stated herein.

7.5.2 Conduit Installation:

7.5.2.1 Exposed conduit shall be installed either parallel with or perpendicular to structural members, unless impractical, and shall be grouped wherever possible.

7.5.2.2 All steel conduit run underground shall be encased within a concrete envelope having a minimum covering over the outside conduits of 3". Spacing between the conduits shall be sufficient to permit filling voids with concrete. Concrete shall be colored red with a suitable additive.

7.5.3 Pullbox Installation:

Pullboxes shall be installed in conduit runs when:

7.5.3.1 In all straight conduit runs exceeding 200 ft.

7.5.3.2 In runs with 3 ells or the equivalent thereof - between fittings and/or outlets.

7.5.4 Grounding Installation:

7.5.4.1 All exposed conductive materials enclosing electric equipment or forming a part of such equipment shall be grounded. This includes items such as cabinets, junction boxes, outlet boxes, controllers, service raceway, conduit, couplings, fittings, cable armor and grillwork. Also, included are switchgear frames, motors, generators, elevators, frames and tracks of cranes and portable equipment.

7.5.4.2 The grounding conductor shall be attached to the grounding electrode by means of a suitable bolted clamp of copper alloy (having silicone bronze nuts, bolts, etc.) or by brazing.

7.5.4.3 All polyphase motors 50 HP and over shall be grounded with a grounding conductor to the nearest building steel on to ground loop.

7.5.4.4 Grounding of Structures

7.5.4.4.1 Ground bus minimum size No. 4/0 AWG.

7.5.4.4.2 Structure ground connections:

Steel framework of buildings shall be grounded as required.

Connections from ground bus to the structure shall be No. 2/0 AWG minimum size. Metal structures for switchgear, lightning arresters, disconnect switches, transformers, etc., shall be individually connected to the ground bus, similar to the building framework.

7.5.5 Wire and Cable Installation:

7.5.5.1 Cable installed in cable tray must be installed in a neat and orderly manner properly spaced and fastened.

7.5.5.2 Cable shall be installed in accordance with manufacturer's recommendations as to maximum pulling tension, minimum installation temperature, minimum bend radii, etc.

7.5.5.3 Cable splices and termination shall be kept to a minimum and shall be located only where they are readily accessible for inspection. Splices shall be made only by qualified cable splicers in strict accordance with the instructions furnished with the splice kits.

7.5.6 600 Volt Cable Termination:

Solderless connectors shall be used wherever practicable for connecting and splicing all wires regardless of size and must be used for all stranded cables. For cables No. 6 AWG and larger, connectors shall be of the compression, clamp, or bolt type. Composition or procelain "wire-nuts" will not be accepted for connecting any wires, regardless of size.

7.5.7 Cable and Wire Marking:

7.5.7.1 All feeders entering or leaving distribution equipment, junction and pull boxes, etc., shall have conductors tagged as to phase identification; i.e., "A," "B," "C," or "1," "2," "3" and with circuit designation.

7.5.7.2 All motor leads and control circuit conductors shall be tagged with identification numbers as designated on the wiring diagrams, at each location such as motor control centers, starters, operator's panel, etc.

7.5.7.3 Wire and cable for lighting circuits shall be color coded as follows:

Phase 1 - Black

Phase 2 - Red

Phase 3 - (if used) Blue

Neutral - White

Ground - Green

7.5.8 Minimum Tests Required:

7.5.8.1 Entire system shall be placed in proper operating condition, all components tested and secured, controls and relays adjusted to protect their respective loads, loads balanced as closely as practical, auxiliary systems complete for all functions, free from malfunction and the complete system in its entirety ready for trouble-free service.

7.5.8.2 Ground resistance of grounding system shall be:

7.5.8.2.1 Equipment grounds (other than outdoor substation) 10 ohms maximum.

7.5.8.2.2 Outdoor substation, 5 ohms maximum.

7.5.9 All equipment is subject to inspection by Owner and must be operated to complete satisfaction prior to final acceptance by Owner.

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

TECHNICAL SECTION 8

Instrumentation

8.1 Instrumentation:

The Contractor shall furnish all engineering design, procurement, and labor for the installation of instrumentation or instrumentation systems designed to indicate and/or record and control the variables necessary for functional, safe and efficient cement production. All equipment and material are to be up to date and represent the proven current state of the art for cement kiln and auxiliary equipment control. Due to the remote location of the plant site with reference to instrument suppliers, the instrumentation should be unusually sturdy, simple in operation, maintenance free, and suitable for use in a tropical climate and the dusty environment inherent to cement plants.

8.1.1 All instruments shall be calibrated in metric units; that is,

Temperature	- Degrees centigrade
Flows	- Liters/minute or cubic meters/hour
Weight	- Grams, kilograms, metric tons
Pressure	- Kilograms per square centimeter
Levels	- Meters, centimeters.

8.1.2 Instrumentation symbols and nomenclature shall be that set forth in the Instrument Society of America, Practice 5.1.

8.1.3 Instrumentation supplied should be the electrical or electronic type.

8.1.4 Plant air is available at 80-100 psi. It must be filtered and dryed before use in instrumentation, if required.

8.1.5 Instrumentation presently in use on the existing plant is Leeds and Northrup of Philadelphia.

8.2 Description of Work:

8.2.1 General:

8.2.1.1 All slurry pumps shall be provided with a pressure reducing regulator and a pressure gauge for seal water.

8.2.1.2 A tap to which a gauge may be attached is to be provided at the discharge of each pump. Slurry pumps shall be provided with a 1" connection and all others with 1/2" connection.

8.2.1.3 All oil cooling or lubrication systems shall be provided with oil temperature and oil level alarms. Cooling water failure annunciator shall also be provided where necessary.

8.2.1.4 Temperature alarms shall be provided for ball mill bearings.

8.2.1.5 Air compressor system shall be complete and include, as applicable, capacity control based on discharge pressure, oil pressure alarm, cooling water control with alarm, discharge air temperature alarms, air receiver pressure gauge, air receiver relief valve, air receiver temperature indicator, and an interlock system to stop the compressor should the applicable preceding exceed normal limits.

8.2.1.6 Plugged taps shall be provided at points such as cyclones, dust collectors, fans, etc., throughout the new installation from which temperatures, pressures and drafts readings can be made to facilitate trouble shooting and check out of equipment or systems.

8.2.1.7 Dust collectors which may be subjected to dangerously high temperatures shall be provided with a local temperature indicator and a high temperature alarm and/or light.

8.2.2 Area "A" - Clay Processing
Area "B" - Primary Crushing
Area "C" - Secondary Crushing
Area "D" - Storage Building
Area "F" - Correction Tanks
Area "K" - Packhouse and Cement Storage
Area "L" - Bag Storage
Area "P" - Laboratory and Office
Area "Q" - Machine Shop and Warehouse
Area "R" - Grease and Lube Oil Storage
Area "S" - Change House
Area "T" - Water Purification Plant
Area "Y" - Yard and Quarry:

No instrumentation work in these areas except for items required under paragraph 8.2.1.

8.2.3 Area "E" - Mill Area:

8.2.3.1 Raw Mill (wet grinding) System

On outlet sump of each wet mill, provide high-low level control consisting of double sensor floatless conductance electrode type controller to stop pump in event flow of slurry from the mill is stopped and to start pump again when flow of slurry is started. The probes to be stainless steel with PVC shielding.

8.2.3.2 D.S.M. Screen

Inlet to each D.S.M. screen to be provided with diaphragm sealed pressure gauge to read inlet pressure to each classifier. The sump from the D.S.M. screen is to be provided with high-low level control similar to preceding paragraph.

8.2.3.3 New Finish Mill

The instrumentation or instrumentation system in conjunction with the new finish mill grinding system shall consist of the following items or perform the following functions.

8.2.3.3.1 Instrument control panel, fully enclosed with dust tight doors or covers. Panel shall have all instrumentation piped and/or wired to bulkhead bars or terminal strip to facilitate ease of connection to external items. Each connection shall be clearly marked and identified. All wiring shall be tagged at both ends.

It shall contain running lights and pushbuttons to control all items associated with the system.

In addition to the operating controls, instrumentation shall be provided to perform the following functions:

- indicate power consumption of the mill.

- indicate temperature of the cement being discharged from the mill.

8.2.4 Area "G" - Kiln Feed Building
Area "H" - Kiln
Area "J" - Cooler and Burner Building:

The instrumentation or instrumentation systems in these areas shall consist of the following items or perform the following functions.

8.2.4.1 Instrument control panel, free standing with benchboard, fully enclosed cubicle with rear dust tight doors. Panel shall have all instrumentation piped and/or wired to bulkhead bars or terminal strip to facilitate ease of connection to external items. Each connection shall be clearly marked and identified. All wiring shall be tagged at both ends.

A graphic representation of the process shall be located across the top of the control panel. It shall contain running lights (miniatures) to indicate the status of all motors on the process.

Pushbuttons and running lights shall be mounted in the benchboard section of the control panel.

The panel is to be located in a room at the firing end of the kiln. The room is to be pressurized with filtered dust free air and is to be of cement block construction and is to contain windows which will afford the operators a view of the general burner floor area.

8.2.4.2 Instrumentation shall be provided to perform the following functions:

8.2.4.2.1 Record kiln firing zone temperature using an optical pyrometer as a temperature sensing element.

8.2.4.2.2 Record dust chamber temperature and induced draft fan inlet temperature on one instrument.

8.2.4.2.3 Record oxygen and combustionables in the kiln outlet gas. Provide the

analyzers, sampling and associate accessories. Provide a water type sample system as no steam will be available. Provide bottles of gas for calibration of the units.

8.2.4.2.4 Provide draft indicators for:

- Kiln firing hood
- Dust chamber (feed end)
- Cooler dust collector inlet
- Cooler exhaust fan inlet

8.2.4.2.5 Control kiln draft by modulating a louvre damper on the inlet of the induced draft fan. Record the draft and provide auto-manual switching at the control panel. Draft shall be measured at the firing end hood.

8.2.4.2.6 Record kiln speed and count kiln revolutions on a six digit counter. Provide means to regulate kiln speed from the control panel.

8.2.4.2.7 Provide a flow control loop for slurry feed utilizing a magnetic flow meter as a measuring element, record and integrate the slurry flow, and control the flow by modulating the speed of the slurry feed pump(s). Provide auto-manual switchover at the panel.

8.2.4.2.8 Provide panel mounted lights to indicate a maximum kiln travel in either direction.

8.2.4.2.9 Provide ammeters for:

- Kiln drive motor

- Induced draft fan motor

8.2.4.2.10 Provide the necessary instrumentation in the clinker cooling system for automatic control of drafts, temperature, and pressures.

8.2.4.2.11 Provide a combustion control system for the kiln burner for providing safe and efficient firing of the kiln. Kiln firing rate is to be remote, manually set from the control panel.

8.2.4.2.12 Provide for the reclaimed dust a control system to regulate the dust slurry density and feed to the kiln.

8.2.4.2.13 Provide thermocouple type temperature record and alarm on gas temperature entering the chain section temperature signal off the rotating kiln with a pantograph.

8.2.5 Area "N" - Fuel Oil and Diesel Oil Storage:

Provide temperature and pressure gauges for the kiln fuel oil heating system.

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

TECHNICAL SECTION 9

Equipment

9.1 General:

The Contractor shall provide all machinery, equipment, supervision, installation materials, tools, temporary work, and all other items of work necessary or required to provide in accordance with the Contract Documents' process equipment items or systems, complete in every respect and guaranteed to be substantial, safe, and ready for regular operation and use by the Owner.

The work includes procurement, forwarding, receiving, unloading, uncrating, inspecting, moving, handling, temporary storing if necessary, assembling, setting in place, connecting, aligning, securing, lubricating, operating, and testing all equipment and machinery including their appurtenances.

9.1.1 Receiving, Unloading, Checking, and Storing of Equipment and Material:

All materials and equipment shall be handled in accordance with the requirements of the "Special Conditions."

9.1.2 Installation:

Installation of an item of equipment shall be construed to mean complete with all drives, motor, couplings, safety guards, protective devices, piping, and electrical connection and other appurtenances as necessary for a complete operating unit.

9.1.3 Manufacturer's Supervision:

The Contractor shall provide, as part of the fixed U.S. dollar portion of the work, the services of manufacturer's supervisory or service personnel as may be required for the proper installation and start-up of equipment.

9.1.4 Workmanship:

9.1.4.1 All installations shall be in accordance with the manufacturer's installation drawings, manuals, instructions, and procedures. The Contractor shall not proceed with any item without proper drawings, data, and instructions.

9.1.4.2 Equipment shall be properly aligned and shimmed before grouting.

9.1.4.3 Anchor bolts in concrete shall be checked before setting equipment. Sleeves must be cleaned out and bolts properly positioned.

9.1.4.4 Hold down nuts shall be tightened carefully to prevent misaligning the bed plates and/or machines.

9.1.4.5 All internal and external shipping attachments on equipment shall be removed and the surface ground smooth.

9.1.4.6 Field alterations shall not be made without prior approval of Owner.

9.1.4.7 Welding, cutting, grinding or other operations to correct deficiencies or to facilitate Contractor's work is prohibited unless approved by Owner.

9.1.4.8 Equipment installed but not operated for a period of time shall be rotated or turned over in accordance to the manufacturer's recommendation.

9.1.4.9 Equipment shall be installed so as to minimize self-generated vibration. Limit of vibration shall not exceed those stipulated by the manufacturer of equipment.

9.1.5 Cleaning of Equipment:

9.1.5.1 All equipment shipped with a protective coating shall have such coat removed in accordance with the manufacturer's recommendation or in accordance with best practice.

9.1.5.2 All equipment shall be left free of excess oil or grease and free of dirt, rust, or other objectionable substances.

9.1.5.3 Machined surfaces shall be protected against rust and other damage in the period between removal of protective coating and start-up.

9.1.5.4 Interior surfaces of all equipment, including tanks and bins, shall be cleaned thoroughly before operation.

9.1.5.5 Machinery oil reservoirs shall be cleaned thoroughly before servicing for operation.

9.1.5.6 Special cleaning compounds shall be used when recommended by the manufacturer.

9.1.6 Lubrication:

9.1.6.1 All equipment shall be thoroughly and completely lubricated in strict accordance with manufacturer's instructions or recommendations.

9.1.6.2 The Contractor shall furnish all lubricants, hydraulic oils, coolant fluids, etc., required for initial

start-up and testing. All lubricants are to be the same as or compatible to those in current use by the Owner unless specified otherwise by equipment manufacturer.

9.1.6.3 The Contractor shall furnish all flushing oils required to clean systems.

9.1.6.4 Items which have been factory lubricated before operation shall be checked to assure that initial lubrication is still intact.

9.1.6.5 No equipment is to be operated before it is properly lubricated.

9.1.6.6 The kiln, ball mill, and other applicable equipment are to be rotated each week to circulate oil through the bearings and speed reducer.

9.1.7 Guards:

All rotating, reciprocating, or otherwise moving equipment or any part thereof shall be provided with appropriate guards to protect personnel.

9.1.8 Access Platforms and Walkways:

All equipment shall be provided with platforms, walkways, stairs, etc., as may be necessary for the proper operation and maintenance of equipment.

9.1.9 Grouting:

Grout shall be of the non-shrinking type with a compressive strength of 5,000 psi at 28 days. Non-shrinkage admixture shall be Master Builders' "Embecco" or approved equal.

9.1.10 Welding:

In general, welding shall be by qualified welders in accordance to the American Welding Society (AWS) Standard Code for Arc and Gas Welding in Building Construction. Equipment welding such as kiln, etc., shall be in accordance to the manufacturer's recommendations.

9.1.11 Shop Inspection:

All equipment shall be subject to inspection in accordance with requirements of "Special Conditions."

9.1.12 Service Factors:

All equipment shall be based on heavy duty 24 hour service and service factors shall be latest AGMA factors for the particular application unless specified otherwise herein.

9.2 Equipment Description:

9.2.1 General:

9.2.1.1 Pumps (general for all pumps):

9.2.1.1.1 So far as practical, the number of different sizes and models of pumps should be kept to a minimum in order to reduce the stocking of spare parts.

9.2.1.1.2 Pumps within a particular range should all be of the same make.

9.2.1.1.3 It is desired but not mandatory that all pumps be of the same make.

9.2.1.1.4 Slurry pumps shall be provided with nickel alloy wetted parts.

9.2.1.1.5 In cases where existing pumps are being replaced, the Contractor is to verify or establish the head requirements of the new pumps and, in cases where pumps are being increased in capacity, is to verify adequacy of existing pipe lines or piping systems and make necessary alterations or modifications.

9.2.1.1.6 Slurry data is indicated on Drawing 0592-M103.

9.2.1.2 Screw Conveyors:

Screw conveyors shall be suitable for cement plant duty.

Screw conveyors shall be sized assuming 20-30% loading and shall be of dust tight construction with removable bolted covers. Hanger bearings shall be floating type and shall be white iron or manganese. Horsepower for screw conveyors shall be based on assuming 45% loading. Shaft design shall be based on full motor horsepower with 1.5 service factor for torsion and bending.

Roller chain drive shall be designed on the basis of rated motor horsepower with a service factor of 1.4. Drive sprocket to have a shear pin hub and be designed for rated motor horsepower with a service factor of 2. Chain guards shall be oil type for bath type lubrication.

9.2.1.3 Bucket Elevators:

Bucket elevator shall be suitable for cement plant duty.

Buckets shall be furnished with hard double bead lip and, so far as possible, shall be same size and model to minimize stocking of spare parts. Size and model of existing buckets shall be given consideration so far as practical in design of new bucket elevators.

Head shaft shall be AISI-1045 heat treated and stressed relieved steel. Shaft design shall be based on full rated horsepower and 1.5 service factor for bending and torsion. Heavy duty roller bearings and roller type backstop shall be provided.

Foot shaft shall be same material as head shaft. Bearings shall be dry type with manganese bushings. Take-up shall be internal gravity type.

Casing shall be of dust tight construction, complete with dust tight inspection and service doors. Head section shall be 12 gauge minimum thickness; boot section, 1/4" minimum thickness; and intermediate sections of 10 gauge minimum thickness.

Design for elevators handling fine materials is to be based on 75% bucket water level and, for coarse materials, on bucket water level. Horsepower of motors to be based on full capacity of buckets. Chain is to be based on full capacity of buckets with service factor for heavy-duty continuous cement mill service. Single strand chain shall be provided wherever possible by design considerations.

Monorail of I-beam type at right angles to the head shaft shall be provided over all bucket elevators of sufficient size to handle complete chain and bucket.

Drive shall be roller chain drive and shall be designed on the basis of rated motor horsepower with a service factor of 1.4 and maximum ratio of approximately 3 to 1 for the sprockets. Drive sprocket shall have shear pin hub with shear pin designed for rated motor horsepower with a service factor of 2 for horsepowers over 15 and a service factor of 2.5 for horsepowers under 15. Chain guards shall be oil tight for bath type lubrication.

9.2.1.4 Belt Conveyors:

Belt conveyors shall be suitable for cement plant duty and shall conform to Conveyor Manufacturers Association specification for this duty.

Head shaft shall be AISI-1045 heat treated and stress relieved steel. Shaft design shall be based on full rated motor horsepower and 1.5 service factor for bending and torsion. Bearings shall be heavy duty roller bearings; one fixed and one expansion type. Backstop shall be provided if necessary.

Foot shaft shall be same material as head shaft. Bearings shall be heavy duty roller with adjustable take-up.

Belting shall be RMA Grade I, minimum 4 ply.

Carrying Idlers shall be 6" diameter steel rolls with 3/4" diameter hollow shafts. Return idlers shall be 5 1/2" diameter rubber spiral rolls. Idlers to be regreasable type with alemite grease fittings.

Drive shall be roller chain designed on the basis of rated motor horsepower with a service factor of 1.4. Maximum ratio shall be approximately 3 to 1 for sprockets. Drive sprocket to have shear pin hub. Shear pin is to be designed for rated motor horsepower with a service factor of 2.0. Chain guards shall be oil tight for bath type lubrication

9.2.1.5 Chutes and Hoppers:

Chutes and hoppers shall be of carbon steel plate. Thickness of plate and size and spacing of stiffeners shall be based on design requirements. Minimum thickness of plate shall, however, not be less than 1/4". Minimum thickness of covers, where required, shall be not less than 3/16".

Chutes handling clinker shall be provided with removable 1" Ni-hard liners on the sides and bottom. Other chutes need not be lined.

9.2.1.6 Dust Collector Duct Work:

Dust collector duct work shall be made of a minimum of #10 gauge steel and shall be equipped with adjustable blast gates and provided with capped connections for allowing measurement of flow.

9.2.2 Area "A" - Clay Processing Area:

9.2.2.1 Clay Wash Mill Pump (two):

Two new pumps to replace existing 505 gpm pumps (existing Items VIII-9a and 9bx). Pumps to be complete with new drives, motors, etc.

Sp. Gr. - 1.24
% Solids by Weight - 31.6%
Particle Size - 95% - 200 Mesh
Temperature - Ambient

9.2.2.2 Clay Transfer Pumps:

Two new pumps to replace existing 295 gpm pumps (existing Items VIII-17ax and 17bx). Pumps to be complete with new drives, motors, etc.

Sp. Gr. - 1.23
% Solids by Weight - 30%
Particle Size - 99% - 200 Mesh
Temperature - Ambient

9.2.2.3 Clay Tank Agitator:

New slurry agitator for existing 50' diameter x 40 ft. high clay storage tank. Dorr or equal with auxiliary air agitation.

9.2.3 Area "D" - Storage Building:

Two new bridge cranes to fit and be installed in the existing storage building.

Contractor is to make all necessary electrical and structural modifications to existing facilities necessary to accommodate new cranes.

9.2.3.1 Crane Service:

Heavy duty continuous, 24 hours per day grab bucket service in cement

clinker and raw material storage building. Crane will conform to E.O.C.I. Spec. No. 61, Crane Service Classification, Class "E" (severe duty cycle service).

9.2.3.2 Number of Cranes Required: Two

9.2.3.3 Crane Type:

9.2.3.3.1 Two-girder overhead bridge crane. Crane auxiliary girder will be provided to aid in support of the bridge drive machinery controls, etc.

9.2.3.3.2 Box girders to be so constructed as to eliminate accumulation of water or oil inside of them. Welded girders to be provided with breathing holes and drain holes. Special care shall be taken with crane to eliminate crevises or openings where water may accumulate and cause corrosion.

9.2.3.4 Bridge:

9.2.3.4.1 Span - 80 ft. (24.38 meters) center to center of rails.

9.2.3.4.2 The bridge is to have a three-gear drive consisting of a motor connected to a self-contained gear reduction unit, located at center of span, which will be connected by sections of line shafting to self-contained gear reducers located near end of crane

and these are connected to the wheel axles by means of a floating shaft with half flexible couplings.

9.2.3.4.3 Line shaft couplings are to be made from wrought steel or from rolled or forged steel. They are to be of the bolted straight flange type and be provided with a face key and plain bolts or without face key and with body bound bolts. Couplings shall be located close to bearings and be provided with substantial removable guard at least 12" wide.

9.2.3.4.4 Footwalks:

Level steel footwalks made of approved grating, maximum nominal opening - 1/2" x 4, shall be provided on outside of both girders for the full length of crane, extending to web plate of the girders and fitted around all irregularities.

Where practical, walk shall be extended over end carriages and cab, making it continuous around crane.

Footwalks shall be of width to give a minimum of 27" clear passage at all points, except between railing and bridge motor or nearest part of trolley

where clearance may be reduced to not less than 18".

Width of trolley walks shall not be less than 15".

The footwalk along girders should have at least 6'-6" headroom clearance below roof chords or any part of crane structure.

Footwalk grating shall be field-welded to supports.

Crane shall be furnished with walkway grating having main bars no less than 1/4" thick supported by cross-bars having no dimension less than 5/16" (5/16" hex or square bar is preferred). Cross-bars must be continuous across the grating section and must be banded. 1/2" x 4" nominal openings shall be a maximum.

9.2.3.5 Crane Capacity:

13 tons (11.8 metric tons) minimum.

Weight of Bucket	*12,100#
Material - *150 cu. ft. heaped capacity at 90#/cu. ft.	*13,500#
TOTAL	*25,600#

*To be verified by Contractor on basis of bucket being furnished by Contractor.

9.2.3.6 Trolley:

9.2.3.6.1 One required.

9.2.3.6.2 Maint Hoist:

Double drum type for handling 3 1/2 cubic yard bucket. Drums shall be made of rolled steel and shall have flanged ends of not less than 1" in thickness projecting 2 1/2" beyond the body of the drum. Guards must be provided at the ends of the drums to prevent the ropes from interfering with other trolley ports due to the rope action. The drums will be located at right angles to the bridge girders and bucket suspended so that it opens parallel with the bridge girders.

9.2.3.6.3 The trolley shall be of the floored-over type with no openings except for the ropes.

9.2.3.6.4 Hoisting ropes shall be an approved hoist cable, constructed of six (6) strands of thirty-seven (37) wires each, laid around a hemp core.

9.2.3.6.5 The standard diameter of hoisting rope shall be 3/4", 7/8", 1", 1 1/8", 1 1/4" or 1 3/8".

9.2.3.6.6 Guards shall be provided on the crane to prevent the hoisting ropes from coming in contact with the conductors.

9.2.3.6.7 Ropes shall be so reeved as to eliminate reverse bends.

9.2.3.7 Bucket:

Bucket to be furnished with each crane shall be 3-line, 5 cu. yds. rated capacity. Bucket shall be Blaw Knox medium weight wide rehandling, Mod. 7500, or Customer approved equal. Bucket shall be furnished complete with equalizer, wedge socket connections, and high alloy (#4140) lips.

9.2.3.8 Hoist Speed & Lift: 225 FPM - 70 ft.

9.2.3.9 Bridge Speed: 350 FPM.

9.2.3.10 Trolley Speed: 250 FPM.

9.2.3.11 Number of Cranes on This Runway:

Three (3) - One existing.

9.2.3.12 Length of Runway: 450 Ft.

9.2.3.13 Operator's Cab:

9.2.3.13.1 The operator's cab shall be built of structural steel and fireproof material with a clear height with equipment installed of not less than 6'-6" and shall be made substantial and rigid by proper gusset plates and braces, welded or riveted; but such bracing shall not interfere

with access to cab or vision of operator. Cab shall also be braced to prevent swinging and shall be supported by members having all rivets in shear.

Enclosed cab to be full vision type with sufficient number of sliding type windows. Glass shall be replaceable from inside the cab.

9.2.3.13.2 Operator's cab will be air conditioned. (Wool bag filters are not acceptable.) Air-conditioning unit will be Dravo C-3H or Customer approved equal. Electric warning gong or siren will be provided.

9.2.3.13.3 Skin plate to be not less than 1/8" thick; windows to be of tempered safety glass, single thickness or double in insulating type as required by heat conditions.

Cab shall have fiberglass insulation in floor, sides and roof with liner plates of not less than 16 gauge steel.

9.2.3.13.4 The floor of the cab, which shall be 1/4" thick steel plate, is to be extended to form a landing platform which is to be provided with hand railing.

9.2.3.13.5 Crane cab shall be provided with adequate lighting. Where magnetic control panels are installed in the cab, lighting is to be provided in that section of cab with separate control switch on a circuit connected between the main disconnect switch on the footwalk and the one in the cab.

9.2.3.13.6 Cab shall be provided with an operator's seat as manufactured by American Seating Company, Model 300-67-023219 RH, or approved equal.

9.2.3.13.7 Safety glass windows will be provided in all four sides and access door.

9.2.3.14 Bumpers:

Four (4) manufacturer standard bridge spring type. Bridge bumper height to match height of bumpers on existing cranes. Trolley shall be provided with spring type bumpers.

9.2.3.15 Bearings:

9.2.3.15.1 Anti-friction bearings shall be selected to give a minimum B-10 life expectancy, based on full rated speeds of 30,000 hours.

9.2.3.15.2 Anti-friction bearings shall be fitted with grease or oil seals of a type approved by purchaser.

9.2.3.15.3 Track wheel bearings are of the spherical anti-friction type; one (1) bearing on each track wheel axle shall be of the fixed type, one bearing to be arrnaged to allow for expansion or float of the axle.

9.2.3.16 Control Panel Location:

Bridge Footwalk.

9.2.3.17 Couplings:

M/GS standard. All couplings will be provided with removable guards.

9.2.3.18 Main Runway Rail: Existing 135#.

9.2.3.19 Gear Housings:

9.2.3.19.1 All gears shall be entirely enclosed with oil tight housings so designed that gears will run in oil and shall have sufficient clearance to prevent their being struck by any of the enclosed parts should gear ratio be changed.

9.2.3.19.2 Housings shall be split horizontally and so fastened and arranged that top half can be removed for inspection and repairs without distrubing the bottom half.

9.2.3.20 Track Wheels:

9.2.3.20.1 Each crane to be eight wheeled. Present rails are U.S.S. 135#.

9.2.3.20.2 All track wheels are to be double flange wrought steel sections with toughened treads or equal.

9.2.3.20.3 Rail sweeps will be provided in front of all bridge wheels.

9.2.3.21 Trolley Rail:

Manufacturer's standard.

9.2.3.22 Brakes:

9.2.3.22.1 Hoist Brakes:

Both hoist motors will be equipped with rectified DC magnetic brakes, each rated at 200% full motor torque.

9.2.3.22.2 Trolley Brakes:

Trolley motor will be provided with a DC clapper type brake rated at trolley 100% full motor torque.

9.2.3.22.3 Hydraulic Bridge Cranes:

The bridge will be provided with a hydraulic foot brake rated at 200% full motor torque.

9.2.3.23 Lubrication:

9.2.3.23.1 Arrangements shall be provided by crane builder to permit the proper lubrication of all parts requiring same and all fittings and equipment necessary for this purpose shall be furnished. The crane will be provided with industrial type Alemite fittings throughout.

9.2.3.23.2 Each bearing shall have an individual lubricating fitting located at an easily accessible point. Anti-friction bearings shall be provided with vents equipped with relief fittings to prevent air pockets. Vents shall be so located as to be visible to the operator when greasing.

9.2.3.24 Electrical:

9.2.3.24.1 All electrical equipment furnished with the crane shall be:

As specified in "The Electrical Overhead Crane Institute" publication, Specification No. 61.

Suitable for installation in a tropical climate.

Designed for use with 460 volts, 3 phase, 50 hertz electrical power.

9.2.3.24.2 Each alternating current motor starter shall contain a 460 volt to 120 volt control transformer of suitable size. All operating devices such as control switches, push-buttons and other control devices shall be wired to the 120 volt control circuit. All electrical control devices shall be contained in NEMA 4 enclosure.

9.2.3.24.3 Conductors:

If possible, existing mainline electrification with necessary supports of the inverted angle type shall be utilized. Crane will be provided with sliding shoe mainline collectorsz for these inverted angle conductors. Bridge span conductors will be inverted steel angles mounted inside the girders and outside the rear girder. Collectors will be arranged for bottom contact and will be of the spring tension type with double contact shoes.

9.2.3.24.4 Where possible, conductors shall be of single length; otherwise, sections of conductors are to be welded together with contact surface at weld ground smooth.

9.2.3.24.5 Hoist Limit Switch:

Each hoist motor shall be equipped with a standard dynamic braking limit stop, connected directly in the motor circuit to prevent overtravel in hoisting. This limit stop to have a back-out circuit utilizing a limit switch relay for lowering bucket with the limit switch in the tripped position. The limit stop shall be located so as to be easily accessible for inspection and so it will be operated in such manner that no sheave wheels are necessary.

An arrangement using a free swinging weighted beam shall be used to operate the limit switch. Method of tripping shall be submitted for approval.

9.2.3.24.6 Collector Shoes:

The main bridge collector shoes and, also, the trolley collector shoes are to be furnished by the crane builder. Means for easy access to these shoes for repairs shall be provided.

Two (2) collector shoes for each hoist motion are to be furnished.

9.2.3.24.7 Motors:

All motors used on crane to be manufacturer's standard with sealed, anti-friction type bearings.

9.2.3.24.8 Signal Lights:

Signal lights shall be installed. In general, furnish two (2) lintern, two-light, signal lights, one on each side of cab, visible from cabs of adjacent cranes and ground. Colors shall be red and green.

9.2.3.25 Testing and Shipping:

Crane shall be completely assembled and tested in manufacturer's shops. Crane will be suitably match-marked and stripped to facilitate shipment. All parts will be properly prepared and packed for export shipment.

9.2.3.26 Painting:

All work shall be thoroughly cleaned of all loose mill scale, rust, and foreign matter and then given one (1) prime coat and two (2) finish coats of approved paint. All parts inaccessible after assembling, such as inside of box girders and end carriages, shall be well painted before assembling except for riveted or welded work, in which case the surfaces coming in contact are not to be painted. Interior of all anti-friction bearing and gear housings shall be painted with one (1) coat of oil-resisting enamel.

9.2.4 Area "E" - Mill Area:

Ball Mill:

The three (3) 8 ft. diameter by 36 ft. long ball mills currently used for raw (wet) grinding and the ball mill currently used as a swing mill are to be converted to closed circuit wet grinding systems. The work shall be, in general, as indicated schematically on Drawing 0592-2-M102.

The conversion of each mill from the existing open type circuit to the closed type circuit is to be accomplished by the addition of a DSM screen for each mill and pumps, as necessary, for the proper circulation and transport of slurry to the screen and to the correction tanks. Each system is to be arranged to provide for gravity feed of the oversized particles from the screen back to the mill. In order to provide flexibility and to minimize the number of pumps, the mills are to be piped in pairs.

The mills currently each produce approximately 35 metric tons per hour (dry solids) ground to 88% - 200 mesh. Each closed grinding system is to be designed on the basis of 50 metric tons per hour of solids 88% passing 200 mesh. The moisture content is to correspond to paragraph 9.2.6.

The system is to be designed on the basis of a circulating load between the mills and screen of 175 M.T. per hour solids of 0.5% plus 50 mesh.

9.2.4.1 Screens:

DSM screens shall be Dorr-Oliver or equal, 270° with 11.1 sq. ft. screen area. Pressure (slurry to screen) must be maintained at 20 psi at screen.

9.2.4.2 Pumps (mill to screen):

Wilfley, Model "," or equal. Three (3) pumps to be provided for each pair of mills; two operating and one spare.

9.2.4.3 Pumps (accepts from screen to storage):

Wilfley, Model "K," or equal. Two (2) pumps for each pair of mills; one operating and one spare.

Pipe lines to be modified as required.

Finish Mill Grinding System:

A complete new clinker grinding system is to be provided, capable of reducing ASTM Type I Portland cement clinker and gypsum from a feed size of minus 3/4", as received from the storage, to a finished product, specific surface averaging not less than 3,200 cm^2/gram as determined by the Blaine permeability method at a minimum rate of 43.6 metric tons per hour, and capable of delivering the finished product to any of the existing silos in any of the three existing stockhouses.

NOTE: The existing 8' x 36' clinker grinding mills with 1,000 hp motors operated in closed circuit have, over a 5-year period, produced ASTM Type I Portland cement at an average rate of 21.31 metric tons per hour at a specific surface average of 3393.4 Blaine. This is equivalent to an average of 35.0 KWH/metric tons.

The system is to include but not necessarily be limited to ball mill, hoppers, slide gates, feeders, belt conveyors, pre-cleaner cyclone, air slides, bucket elevator, air separator, bag type dust collector, rotary feeders, screen conveyors, F-K pump and compressors.

9.2.4.4 Ball Mill:

Type - two-compartment, dry grinding.

Mill Size - to be recommended by manufacturer. Prefer flange to flange length diameter ratio of approximately 2.9 to 1.0.

Mill Speed - from 73% to 75% of critical speed for average inside diameter of shell liner plates.

Direction of Mill - clockwise standing at the feed end of the mill and looking toward the discharge end unless otherwise specified by the Owner.

Feed Arrangement - drum type.

Discharge Arrangement - mechanical discharge.

Shell - to be stress relieved after all welding is completed:

Material - ASTM A-7 or equal.

Thickness - to be specified by manufacturer.

No. of Compartments - Two

First compartment about 1/3 of effective mill length.

Second compartment about 2/3 of effective mill length.

No. of Manholes - Four (two in each compartment spaced at 180°).

Size of Manhole - Approximately 29" x 16" oval shape preferred.

Liners -

First Compartment - Type C Lorain high carbon wedge bar bolted type or equal. Minimum plate thickness, 2 1/2". Lift height, 2 1/2". Type M3714A lift bar.

Second Compartment - Type A Lorain high carbon wedge bar bolted type or equal. Minimum plate thickness, 2". Lift height, 1 5/8". Type M3715A lifter bar.

No. per Circle - to be specified by manufacturer.

Size - to pass through manhole.

Machinery - parts to be stressed relieved prior to machining. The shell flanges shall be machined simultaneously to insure true alignment and squareness. A male-female joint shall be machined between the shell flanges and head to align the trunnions and to remove the shear load from the head bolts.

Partition - double diaphragm type.

Material - chrome moly steel or equal.

Slot Size - 1/2" with double taper.

Screen Thickness - 2 1/2".

Construction: to be specified by manufacturer with chrome moly center cone. Screen segments to be held in place by bolts and keeper bars. All parts must pass through manhole.

Discharge End Screen -

Material - chrome moly steel or equal.

Slot Size - 1/2" with double taper.

Screen Thickness - 2 1/2".

Lifters - to be specified by manufacturer. To be separate from head. Head to be lined with replaceable steel plates or equal liners.

Trunnion Sleeve - cast iron or equal, conical.

Screen Bolts - to be provided with leak proof washers. All pieces must pass through manholes.

Feed End Head Lining -

Material - chrome moly steel or equal.

Thickness - 3".

Heads -

Feed End - cast steel annealed .25/.35 carbon or equal.

Discharge End - cast steel annealed .25/.35 carbon or equal.

Trunnions - cast integral with mill heads or bolted to head. Heads and trunnions to be stress relieved prior to machining.

Bearings - Approximately 54" diameter x 28" long, self-aligning type.

Pedestal Caps - fabricated steel, insert babbited (sterling grade).

Sole Plate - fabricated steel or cast steel.

Cooling - water jacketed bearing insert.

Lubrication - each main bearing shall be lubricated by means of at least two (2) oil rings fastened to the mill head trunnion. The oil rings shall dip into the oil reservoir and bring the oil to the top of the bearing. Dual spring loaded wipers shall remove the oil from the rings and deposit it on top of the trunnion. Bearing housings are to be provided with oil gauges and with connections for internal piping.

A separate high lift pump shall be provided for each main bearing for start-up, complete with an initial motor, pressure gauge and piping. The high lift pump is to elevate and float the mill on an oil film that reduces starting torque to a minimum and reduces danger of bearing wear at start-up.

NOTE: The above described mill main lubrication, upon approval of Owner, may be altered to conform to mill manufacturer's standard design. If different from above Contractor prior to placing, order must describe the system fully and obtain Owner's approval.

Main Drive - Drive Trunnion Extension Spider

Material - cast steel.

No. of Discharge Openings - to be specified by manufacturer.

Bolts - spider is to be fastened to the discharge end mill head with heat treated body bound bolts.

Reducer - Falk No. 1100 TCD or equal.

Low Speed Coupling - twin diaphragm type with floating drive shaft connected to the drive spider and low speed reducer shaft.

High Speed Coupling - Falk No. 210F or equal.

Motor Speed - 720 RPM maximum. Drive to be equipped with turning gear mechanism for spotting manholes and mill barrel. Turning gear to be equipped with motor, floor mounted solenoid operated brake, coupling, reducer and limit switch.

Mill Clutch - Fawick dual 24VC 1000 Airflex clutch or equal to be mounted on the drive motor shaft and the high speed shaft of the reducer. The clutch

to be furnished with an axial locking device which restricts any relative float between the reducer input shaft and the output shaft. Clutch to be provided with an independent air compressor of about 40 cfm at 125 psi or as may be required and receiver to supply air to the clutch. The motor shaft is to be drilled throughout its length to admit compressed air to clutch.

Grinding Ball Charge -

Mill shall be designed and powered to operate normally with a minimum grinding ball charge of 40% of effective mill volume in each compartment. Mill volume to be based upon average diameter inside new mill side liner plates. Maximum ball charge to be based upon 43% of mill volume.

The mill manufacturer shall recommend a suitable initial ball charge for each compartment. This recommendation shall show total weight of each size of ball recommended for each compartment.

Balls shall be high carbon forged heat treated round balls with a Brinnel hardness of 550/650 or equal. The balls shall be Lorain, C.F. & I, Shoffied, Coates or equal.

One initial complete ball charge shall be supplied with the mill.

9.2.4.5 Mill Level Control:

A Hardinge Type "T" Electric Ear Sound Control unit or equal shall be provided for controlling mill feed by direct or indirect operation of the feeder motors.

9.2.4.6 Air Separator:

Sturtevant Whirlwind Centrifugal Separator or equal with heavy duty liners, special heavy duty internal construction, set of piping for air cooling in separator, external fineness adjustment control, and with V-belt drive for specified motors.

9.2.4.7 Pre-cleaner Cyclone:

High efficiency low static pressure mechanical separator to separate larger particles from the air mill stream prior to entering dust collector.

9.2.4.8 Dust Collector:

Dust collectors to be automatic, compartmental, continuous bag type dust arrestor suitable for continuous cement plant service. Collector shall be sized on the basis of a 2 to 1 air-to-cloth ratio during normal operations and a 3 to 1 ratio during bag shaking operation or maintenance shut down of a compartment. Dust collector to be sized to handle cooling air from air separator, vent air from mill, elevator, airslides, feeders, F-K hoppers and all other equipment items requiring venting.

Collector shall be so arranged that maintenance personnel can enter a compartment and perform maintenance

with the balance of the collector in operation.

Dust collector fans are to be provided on the basis of a 1.25 service factor.

The dust collector is to be complete with all necessary auxiliaries such as housing, bags, bag holder frames, timer, bag cleaning equipment, hopper discharge plenum, air valves, dust discharge valves, exhaust fan, rotary air locks and screw conveyors where required by layout.

9.2.4.9 Feeders:

Clinker Feeder - Merrick Model WS or equal. Weighfeeder rated from 20 to 60 metric tons per hour.

Gypsum Feeder - Merrick Model WS or equal. Weighfeeder rated from 1.34 to 4 metric tons per hour.

Each of the feeders is to be of sufficient length to convey clinker or gypsum from bin to belt conveyor feeding mill

9.2.4.10 Clinker and Gypsum Feed Bins:

198 metric ton capacity each of configuration similar to existing to fit into existing storage building, complete, with slide gate.

9.2.4.11 Air Slide Systems:

Air slide conveyors shall be standard enclosed type equipped with proper porous medium and shall be of heavy steel plate in bolted mounting flanged sections.

Air slide conveyors shall be complete with air inlet connections, discharge spouts, inspection ports and blowers complete with couplings, intake filter silencer, control valves and gages.

The air slide from the mill to the bucket elevator shall be designed on the basis of a circulating load of six times the capacity of the mill (approximately 260.0 metric tons per hour).

Air slide shall be types manufactured by Fuller Company, Kennedy Van Saun, or equal. Fuller airslides, if selected, are to be provided with wire mesh screen at feed points to protect fabric membrane.

9.2.4.12 Bucket Elevator:

The bucket elevator in the system between the mill and air separator is to be designed for a circulating load of six times the capacity of the mill (approximately 260 metric tons per hour).

Aerated material delivered to the elevator by the air slide is estimated to weigh not more than 80#/ft.^{3}.

Bucket elevator shall be similar or equal to Chain-Belt.

Bucket elevator design shall conform to paragraph 9.2.1.3.

9.2.4.13 Screw Conveyor:

Screw conveyors may be provided where dictated by layout requirements. Air slides are to be the preferred method of conveying cement for short distances.

Screw conveyor design shall conform to paragraph 9.2.1.2.

9.2.4.14 Belt Conveyor:

Belt conveyors, where required by layout, shall be provided in accordance to paragraph 9.2.1.4.

9.2.4.15 Cement Conveying System:

A pneumatic cement conveying system consisting of two pumps, one compressor, and piping system to the existing three stockhouses shall be provided. The new equipment is to be identical to the existing equipment. An interconnecting bypass is to be provided between the existing two pumps and two new pumps so that either set of pumps can be used to transport cement from any of the mills. The new compressor is to be tied into the piping system of the two existing compressors so that normally there would be two operating compressors and one spare.

The existing equipment is listed in Section 10 - List of Existing Equipment.

Work is to include all necessary modifications to existing stockhouses for entry of new conveying pipe line.

9.2.5 <u>Area "F" - Correction Tanks</u>:

9.2.5.1 Slurry Agitators:

Four (4) new slurry agitators for new 36'-0" diameter x 30' high concrete tanks. Dorr or equal with auxiliary air agitation.

9.2.5.2 Slurry Transfer Pumps:

Two (2) new pumps to replace three existing pumps. New pumps to have 50% more capacity or as close thereto as possible as may be dictated by the existing piping system.

Existing pumps as indicated in Section 10 - List of Existing Equipment.

9.2.5.3 Slurry Transfer Pump:

Provide three new slurry transfer pumps to replace existing three pumps. Retain one of the existing pumps for a spare. Existing pumps are as indicated in Section 10 - List of Existing Equipment.

Provide new slurry pump with variable speed drive for the new fourth kiln.

Piping systems are to be interconnected to provide for flexibility of operation.

9.2.6 Area "G" - Kiln Feed Building
Area "H" - Kiln
Area "J" - Cooler and Burner Building:

The new clinker producing facility is to have a capacity of 16.7 metric tons per hour, 400 metric tons per 24 hour day, 125,000 metric tons per annum at 86% of total possible operating time of ASTM Type I Portland cement clinker based on the current slurry moisture of 45.5%. Auxiliary equipment is to be sized to accommodate the above design capacity plus 10%.

Fuel consumption for the existing clinker burning operation during the last six month period has averaged 179.25 liters (47.35 U.S. gals.) per metric ton of clinker. Fuel consumption is to be equal or less than the existing rate for the new clinker producing facilities.

Kiln shall be fired by Bunker C fuel oil with a viscosity of 5000 SSV at 70°F. and heat value of approximately 156,225 gross BTU/U.S. gallon.

The layout of the new clinker burning system shall be, in general, such as to fit into the available space between the storage building and stack breeching without material change to the general plant configuration.

The clinker producing facility shall be a complete and ready to operate facility including, but not necessarily limited to, the following items and/or components.

9.2.6.1 Kiln:

The new wet process kiln shall be of welded steel construction with six supports spaced approximately the same as the supports of the existing three kilns. The distance between the new kiln and existing kiln shall be approximately the same as the distance between the existing kilns. The firing end of the kiln shall line up with the existing kilns and, in elevation, shall have the same approximated relationship with the burner floor as the existing kilns. The feed end of the kiln in plan and elevation shall line up approximately with the existing kiln.

The diameter of the new kiln shall be 11'-0" I.D. so that the refractories used for the existing kilns can be used for the new kiln and that the hot end chain system is interchangeable with the chain system of the existing kilns.

Plate thickness shall be as required by design conditions. Critical areas such as under riding rings, gears, etc., shall be of suitable single plate thickness and shall not be laminated type of construction.

The kiln shall be complete with speed reducer, adjustable speed drive, air seals, slurry chain system, auxiliary kiln drive, alloy steel feed pipe, refractories, firing hood, burner, primary air blower, seal cooling, fan, etc. The alloy steel feed pipe, slurry chain system, and refractories are to be interchangeable with the comparable units of the existing kiln.

The kiln shall be provided with two manholes for accessibility during repair. These manholes shall be located just below the hot end of the chain section. All rollers to be same size so as to minimize stocking of spare rollers.

9.2.6.2 Kiln Feed:

Kiln feed shall be by means of a variable speed feed pump controlled through a magnetic type flow control meter.

9.2.6.3 Kiln Exist Gas Dust Collector:

The collector shall be of the multi-clone type Buell Type AC130, or equal, designed to handle temperature and volume of exist gas. Collector to be complete with dust hoppers, counter-weighted valves, vibrator and all other necessary auxiliaries.

9.2.6.4 Dust Chamber and Dust Seal:

The dust chamber and dust seal shall be refractory lined steel casing with counterweighted seal and counterweighted dust valves. Dust chamber shall be provided with cleanout and inspection doors on both sides and an additional inspection door at the rear to allow inspection of the feed end of kiln. Chamber to be supported on structural steel.

9.2.6.5 Breeching Between Dust Chamber and Dust Collector (Dust Hopper):

The breeching between the dust chamber and dust collector shall be provided with a hopper and dust valve and shall feed dust into dust collecting system.

9.2.6.6 Louver Damper:

An automatically controlled motorized louver type fan damper shall be provided to maintain kiln draft.

9.2.6.7 Induced Draft Fan:

Single inlet, angular discharge, single width, complete with housing 1/4" scroll liners, flanged inlet and outlet connections and access door, and wearing strips on blades.

Breeching to stack and stack opening shall be modified as required.

9.2.6.8 Kiln Dust Reclaim System:

Kiln dust reclaim system or systems shall be provided for the new clinker burning facility and the existing three clinker burning facilities. Under the present systems, dust is collected by screw conveyor and then transported by bucket elevator to the top of the feed building where it is fed into a vortex dust cyclone. The present system does not have adequate retention and agitation, and the dust is not properly wetted and blended into the slurry feeding to the kiln. The existing systems are to be modified as necessary to incorporate them into a new dust handling facility.

The new system or systems shall collect dust from the dust chamber, dust hoppers, and dust collectors and transport it to a mixing tank or tanks with sufficient agitators and retention to thoroughly wet the dust and produce a slurry. The agitators or mixing equipment shall be capable of generating a vortex and sufficient agitation to pull under and wet the dust particles. Make-up water for the system shall be provided through a high pressure water spray system which shall assist in agitating and wetting surface dust.

This system is to be based on a maximum of 5 grains of dust per cubic ft. of exhaust gas but is to contain controls for handling varying amounts of dust in as much as, during normal operation, the dust load will be less. The operation is to be of the continuous type and is to produce a slurry approximately the same moisture content as the feed to the kiln. The slurry is to be pumped back to the nearest correction tank from which the dust slurry will be fed to the blending tanks. A bypass is to be provided to

return the slurry directly to the kilns if so desired.

The system or systems are to be complete with all necessary pumps, controls, piping and other auxiliaries.

9.2.6.9 Firing Hood:

Firing hood shall be refractory lined and contain access door, peephole openings, burner openings, pyrometer openings, and air-cooled seal.

9.2.6.10 Kiln Fuel Oil Pumping System:

The fuel oil heating system is to be a dual type system utilizing a conventional duplex heating and pumping unit for use at initial start-up and a heat exchanger system utilizing a coal and radiant heat at the burning end of the kiln after the kiln has attained its operating temperature.

The system is to be tied into the existing day tanks for source of fuel oil.

The pumping and heating set shall be a Coen Duplex, or equal, complete with necessary base, valves, automatic pressure regulator, spring loaded relief valves, duplex suction and discharge strainers, pressure and suction gauges, thermometer and flow meter.

The heating coil shall have sufficient wrap around kiln to attain required oil temperature at the burner. Each coil shall be provided with an air bleeder valve to atmosphere at the top and an oil drain valve at the bottom draining into a collecting sump or, if possible, returned to the day tank.

The system is to be provided with all necessary safeguards to prevent the overheating of oil including the flexibility to isolate series of coils from the system. Coil and interconnecting piping shall be assembled and tested to meet A.S.A. Code.

The heating and pumping unit and the coil unit shall be piped to provide for recirculation of oil back to the day tank.

9.2.6.11 Clinker Cooling System:

The clinker cooling system shall be capable of taking 16.7 plus 10% metric tons per hour of clinker from the rotary kiln and cool it to a temperature of 150°F. The system shall consist of a Fuller Air Quenching Inclined Grate Cooler or approved equal, including in addition to the inclined grate a drag conveyor, clinker breaker, quenching and cooling air fan, dampers, and shall be complete with all necessary auxiliaries consisting of multiclone dust collector for vented cooling air, fan, and two bucket elevators (one operating and one standby).

9.2.6.12 Clinker Bucket Elevators (Two Required):

Each elevator is to have a minimum capacity of 25 metric tons per hour.

Bucket elevators shall be similar or equal to Rex-Chainbelt.

9.2.6.13 Refractories:

Refractory lining shall be provided for kiln, dust chamber, firing hood, and cooler.

Materials shall be the best quality, free from cracks, warpage and other defects which might impair their strength, performance, durability and serviceability.

Standards of material shall be in accordance to the latest ASTM standards for specific application.

Design of refractory linings shall be the responsibility of the Contractor.

Kiln:

Operations at the plant have indicated that there are seven basic zones within the existing kilns which are 375'-0" long. The following data is for the Contractor's information and use for providing suitable refractories for each zone. The type of refractory is given to indicate the service required and are products produced by Harbison & Walker. Equals produced by other manufactuers are acceptable. The zones indicated start at the hot end of the kiln.

Zone	Length	Refractory
1	1'-4"	Alamo S
2	6'-8"	70% Alusite
3	49'-6"	Basic
4	28'-7"	70% Alusite
5	203'-2 1/4"	50% Dialite
6	81'-10 3/4"	Wylam "A"
7	3'-8"	50% Dialite

Dust Chamber:

Back-up Lining - none required.

Refractory Lining - medium duty fire clay brick (Harbison-Walker Salamander or equal.

Bonding - (Harbison-Walker Harwaco or equal).

Firing Hood:

Back-up Lining - Castable membrane lining fully bonded to hood steel (Harbison-Walker Castable 22 or equal).

Refractory Lining - super duty fire clay brick (Harbison-Walker Alama S or equal).

Bonding - (Harbison-Walker Harwaco or equal).

Cooler:

Lining in accordance to recommendations of the manufacturer.

9.2.7 Area "K" - Packhouse and Cement Storage:

A new pneumatic cement transport system is to be provided for transporting cement from either stockhouse at Packhouse #1 to Packhouse #2. The system is to be capable of delivering 70 M.T./hour of Type I Portland cement and is to be complete with Fuller-Kinyan pump compressor, pump hopper, flow gate, and piping.

The pipe line is to run overhead and is to meet all railroad clearance requirements.

Work is to include all necessary modifications at the tie-in point within the stockhouse and at the discharge point at the packhouse.

The pump, for interchangeability of parts, is to be identical to the pumps transporting finished cement from the mill building.

The compressor is to be furnished complete with force feed lubricator, intake filter silencer, discharge, check valve, relief valve, water flow switch, discharge air temperature switch, pressure gauge, etc.

9.2.8 Area "M" - Power Plant:

9.2.8.1 Replace Diesel Generator Block:

The Owner has purchased a new block for one of the seven existing direct generation. The new block is to be installed under this contract.

9.2.8.2 Plant Air Compressor:

A new 100 psi plant air compressor, complete with tank and all necessary auxiliaries, identical to the existing two units is to be installed and tied into the plant air system.

Existing equipment is listed in Section 10 - List of Existing Equipment.

9.2.8.3 Relocation of Existing Compressors:

At the present time, five air compressors, two (2) 100 psi and three (3) 40 psi compressors, are located in the power house. These units, along with all necessary auxiliaries, are to be relocated in a new compressor house to be provided under this contract.

Existing equipment is listed in Section 10 - List of Existing Equipment.

9.2.8.4 Air Compressor Building Maintenance Crane:

One complete three-ton capacity hand operated, 25'-0" span crane, suitable for cement plant duty. Trolley and hoist low headroom type. Hoist, chain type, complete with hook. Trolley geared, hand chain operated. Hoist lift about 11'-0". Monorail to be hand operated.

9.2.9 Area "N" - Fuel and Diesel Oil Storage (Day Tanks):

9.2.9.1 The oil supply for the new kiln is to be tied into the existing day tank system. An oil heating and pumping system, as covered in paragraph 9.2.6.10, is to be provided.

9.2.9.2 Two new pumps are to be provided for pumping oil from the tank farm near the dock to the day tanks. Each pump is to be capable of furnishing 24 hours supply of fuel for four kilns in a one shift operation.

The Contractor is to review the existing piping system to establish the pump specifications and/or feasibility of increasing the pump capacity on the basis of the existing piping system.

9.2.10 Area "P" - Laboratory and Office:

An automatic telephone exchange with 100 numbers interconnected with the existing unit is to be provided.

9.2.11 <u>Area "Y" - Yard</u>:

9.2.11.1 Clay Trucks:

Two clay trucks, 16-ton capacity, the same as or equal to the existing units, are to be provided.

9.2.11.2 Track Mounted Crane:

P & H Model 955A, or equal, standard crane equipped with 30" crawler shoes, powered by diesel engine with shovel attachment, including 2 1/2 cubic-yard dipper and all necessary cable.

Accessories shall include 50 boom fairleads, Hendrix Model TS or equal dragline bucket, clamshell attachment with tagline, and 3 cubic yards Owne or equal general purpose clamshell bucket.

P. T. SEMEN GRESIK (PERSERO)

SURABAJA, EAST JAVA, INDONESIA

GRESIK CEMENT PLANT EXPANSION

TECHNICAL SECTION 10

List of Existing Equipment

10.1 General:

Based on documents obtained from the Owner, the following is a summary of existing equipment. The existence of all such equipment, especially smaller items such as pumps and components of larger equipment, is not definite; and all data pertaining to the existing equipment must be verified at time of site visitation by the Contractor.

10.2 Area "A" - Clay Processing:

10.2.1 Clay Wash Mills (existing Items VIII-7a & 7b):

26'-0" diameter Kennedy clay wash mill operating at 10.7 rpm. Emsco P-17 1/2 rotary machine, Falk 10 GHA herringbone enclosed gear reducer with motor bed arranged for direct connection to rotary machine and 100 horsepower, 980 rpm, wound rotor motor, Falk 190P double pilot bearing flexible coupling and shaft for connection of reducer low speed shaft to rotary machine. Falk 9F steelflex coupling for connection of high speed shaft of reducer to motor shaft, 100 horsepower at 980 rpm wound rotor drip-proof ball bearing motors.

10.2.2 Clay Wash Mill Pumps (existing Items VIII-9ax & 9bx):

5" Wilfley Model "K" sand pumps, overhead V-belt driven type, 18" diameter wide port runner, Nihard wear parts complete with

overhead fixtures and V-belt drive, 60 horsepower at 1,450 rpm motor.

505 gpm, 126 ft. TDH, S.G.-1.24

10.2.3 Clay Slurry Pumps (existing Items VIII-15ax & 15bx):

4" Wilfley Model "K" sand pumps, overhead V-belt driven type, 16 inch diameter, wide port runner, Nihard wear parts, complete with overhead fixtures and V-belt drive, 30 horsepower at 1,450 rpm motor.

295 gpm, 75 ft. TDH, S.G.-1.23.

10.2.4 Agitators:

Four (4) Dorr 36'-0" diameter x 30'-0" with 5 horsepower motor.

One (1) Dorr 50'-0" diameter x 40'-0" with 7.5 horsepower motor.

10.3 <u>Area "D" - Storage Building</u>:

10.3.1 Bridge Cranes (two existing units):

Make - P & H.

Capacity - Ten (10) Tons (9 metric tons).

Span - 80 ft. (24.38 meters) center to center of rails

Lift - 70 ft. (21.33 meters).

Length of Bridge Travel - 450 ft. (137.16 meter).

Bucket - Blaw Knox Cat. BK-736 buckets with 30" Style "B" equalizer, 3 1/2 cubic yards capacity

10.4 <u>Area "E" - Mill Building</u>:

10.4.1 Clinker Feeder (existing Item):

Merrick Model W.S. Feedoweight, 24" belt width, 8.4 to 25 metric tons per hour, 1 1/2 horsepower motor.

10.4.2 Gypsum Feeder (existing item):

Merrick Model W.S. Feedoweight, 24" belt width, 0.67 to 2.0 metric tons per hour, 1 1/2 horsepower motor.

10.4.3 Clinker Belt Conveyor (existing Item XV-8):

18" wide; speed, 200 fpm; 25 metric tons per hour.

10.4.4 Finish Mill four (4) existing units :

8'-0" diameter x 36'-0" long, two-compartment Kennedy integral gear drive dry grinding mill.

Falk 210F steelflex couplings for connection of high speed pinion shaft of integral gear drive to shaft extension.

6" diameter x 5'-9" long shaft extension with single self-aligning spherical roller pillow block bearing with adjusting base and coupling guard.

Cutler-Hammer No. 54-35, Type DL, magnetic clutch dynamically balanced for 500 rpm, operating with NEMA I manual type rheostat, pushbutton station with red indicating light and collector ring cover.

Mill discharge housing arranged for dry grinding with dust filter connection, pebble screen inspection door and flanged hopper for connection to air slide.

1,000 horsepower, 500 rpm, 0.8 PF open synchronous motor, 40 per cent starting torque and 40 per cent pull out torque.

15 horsepower, 10 kw., D.C. motor generator rated 40° centigrade rise.

Hydraulic lift and gear oil spray pumps with one horsepower at 1,450 rpm motor.

Magnetic clutch with motor generator set.

Four manholes; two in each compartment.

Kennedy double reduction cut herringbone integral gear drive.

GRINDING MEDIA SPECIFICATIONS

Moly-chrome Alloy Steel Grinding Balls

Carbon	60-.90
Manganese	60-1.00
Phosphorous	040 maximum
Sulphur	050 maximum
Silicon	15-.30
Chrome	50-.70
Molybdenum	15-.30
Copper	10-.15

Brinnball Hardness: 600 or higher
Volumetric Hardness: ranging from 90% to 95%

FORGED STEEL GRINDING BALLS

	3/4"-1 1/2"	2" & 2 1/2"	3"
Carbon	0.45-0.55	0.55-6.70	0.60-0.90
Manganese	0.50-0.90	0.50-1.00	0.50-1.00
Phosphorous	0.060 Max.	0.055 Max.	0.060 Max.
Sulphur	0.070 Max.	0.055 Max.	0.070 Max.
Brinell Average	580	435 (oil quenched) 560 (water quenched)	

10.4.5 Cyclone (existing Item XV-39ax):

6 ft. diameter precleaner cyclone with support legs.

10.4.6 Air Separator (existing Item XV-18ax):

Sturtevant "Whirlwind" centrifugal separator, 16'-0" diameter with 60 rejector blades, heavy duty liners, special internal construction including two 14" diameter inlet pipes and two 14" diameter outlet pipes, V-belt drive, 125 horsepower at 1,000 rpm motor.

10.4.7 Dust Collector (existing Item 20ax):

Rees #10-1000A cloth dust arrestor, electric timer to control shaking cycle, line oiler and regulating valve and pressure gauge.

Rees #38 high efficiency exhauster, roller bearing equipped, 125 horsepower at 1,200 rpm motor and V-belt drive.

10.4.8 Air Slide Grinding Mill Discharge to Bucket Elevator (existing Item XVax):

14" Fuller type "FH" air slide, 4,000 ft.^{3} per hour.

Spencer blower, 675 cfm, 5 horsepower at 3,000 rpm motor.

10.4.9 Bucket Elevator (existing Item SV-17d):

108 metric tons per hour capacity, 20 horsepower motors.

Welded and bolted dust tight casings.

10.4.10 F-K Pumps (existing Items SV-24a & 26b):

Type "H2-8" F-K pumps, capacity of 70 M.T./hour, 200 horsepower at 1,000 rpm, 2,300 volts, 3 phase, 50 hertz motor.

10.4.11 F-K Compressors (existing Items XV-25a & 25b):

C-300 Fuller, single compressor, 200 horsepower at 600 rpm, 2,300 volt motor.

10.4.12 Air Slide - Separator to Screw Conveyor (existing Item 61x):

8" F-H airslide conveyor, closed type, 1,000 $ft.^3$/hour.

Bayley Fan - Type "H," V-belt drive, 2 horsepower at 3,000 rpm.

10.4.13 Screw Conveyor to F-K Pumps (existing Item XV-60x):

16" ø, 30 metric tons per hour capacity.

10.5 Area "F" - Correction Tanks:

10.5.1 Slurry Tank Mixers (12 existing, Item Nos. XII-2a through -2h and XII-2ax through -2dx):

Dorr 36'-0" diameter x 30'-0" deep, 0.6 rpm, 5 horsepower at 1,750 motor, with air agitation.

10.5.2 Slurry Transfer Pumps (existing Items XII-3a, -3b, and -3c):

Morris 5R Pumps - 507 gpm, 70 ft. TDH, 50 horsepower at 1,500 rpm.

10.6 Area "G" - Kiln Feed Building
Area "H" - Kiln Building
Area "J" - Kiln Cooler Building:

10.6.1 Slurry Feeder (existing Item XIII-6ax):

Kennedy Ferris-wheel slurry feeder of constant head type, complete with measuring box to check capacity, Foote Brothers gear reducer and Falk couplings, 5 horsepower at 1,150 rpm motor.

10.6.2 Dust Chamber (existing Item XIII-12ax):

Steel casing with counterweighted seal and two 9" counterweighted non-return dust valves, with combination clean-out and inspection doors on both sides. Door at rear of dust chamber so located as to allow inspection of the feed end of the kiln. Refractory lined.

10.6.3 Dust Hopper:

Steel casing.

10.6.4 Multicyclone Dust Collector (existing Item XIII-7ax):

Buell #11A2, Type AC-130 or equal, multi-cyclone dust collector with dust hoppers and counterweighted dust valves.

10.6.5 Induced Draft Fan (existing Item XII-9ax):

Buffalo Forge Fan #16SSL single inlet, top angular discharge, single width, complete with housing with 1/4" scroll liners, flanged inlet and outlet connections and an access door, wearing strips on blades, outboard oil ring, self-aligning water cooled bearing, and Falk 16F flexibie coupling for direct connection to drive motors. 110,000 cfm, 8" S.P. operating at 720 rpm, 250 horsepower at 720 rpm, 2,300 volt motor.

10.6.6 Louver Damper (existing Item XIII-25ax):

Motorized louver type fan damper automatically operated from drive unit to maintain kiln draft. Drive unit remote controlled from kiln control cubicle.

10.6.7 Feed Pipe (existing Item XIII-26ax):

Alloy steel with supporting thimbels for mounting at top of dust chamber.

10.6.8 Rotary Kiln (existing Item XIII-27ax):

11'-0" I.D. x 375'-0" long Kennedy wet process oil fired rotary kiln with six riding rings, slurry chain, totally enclosed Foote Brothers 36 MT triple reduction herring-bone gear speed reducer, Falk 16F flexible coupling for high speed shaft, Falk 220 flexible coupling for low speed shaft, 150 horsepower at 1,150 rpm D.C. motor.

10.6.9 Emergency Kiln Drive (existing Item XIII-33ax):

Le Roi Model H540P3, rated 64 horsepower, continuous at 1,000 rpm with twin disc power take-off clutch and 4 to 1 reduction gear unit.

10.6.10 Kiln Firing Hood (existing Item XIII-30ax):

Kennedy stationary type kiln firing hood with oil burner opening, peephole openings, ray tube opening access door and barring door, air cooled seal.

10.6.11 Kiln Oil Burner (existing Item XIII-34ax):

Coen size 14 with primary air tubes, 25-20 chrome nickel steel air tube ends, chrome nickel cast steel air nozzles and flexible hose, pinch change type burner gun.

10.6.12 Fuel Oil Pumping, Heating and Straining Set (existing Item 35ax):

Coen Duplex fuel oil pumping heating and straining set with capacity of 30 U.S. gpm of bunker "C" oil.

10.6.13 Primary Air Blower (existing Item XIII-43ax):

Rees Size 17, straight blade fan for 6,000 cfm at 13" S.P., complete with direct connected 25 horsepower at 1,450 motors.

10.6.14 Kiln Seal Cooling Blower (existing Item XIII-53ax):

Rees No. 9 high efficiency exhauster, 1,000 cfm at 3" H_2O S.P., 1 horsepower at 1,450 motor.

10.6.15 Clinker Cooler (existing Item XIV-2ax):

Fuller air quenching inclined grate #637 clinker cooler with 7 1/2 horsepower Adjusto-Spede drive, automatic lubrication system, and heavy duty clinker breaker Type C-8 with 15 horsepower at 980 rpm motor, and drag conveyor with 15 horsepower at 1,500 rpm motor.

10.6.16 Cooler Fan (existing Item):

45,847 cfm at 6 1/2" H_2O status with 60 horsepower at 1,450 rpm motor.

10.6.17 Dust Collector:

Multicyclone collector with fan.

10.6.18 Clinker Elevator (XIV-11ax):

23 metric tons per hour.

10.7 <u>Area "M" - Power Plant</u>:

10.7.1 Plant Air Compressor (existing Item XVII-21x):

Fuller Model C-100-100H two-stage, water jacketed, rotary compressor:

100 psig discharge pressure actual free delivery - 537 cfm

motor horsepower - 125

10.7.2 Slurry Agitation Air Compressor:

Fuller Company Model C-200 single-stage, water jacketed, rotary compressor:

40 psig discharge pressure actual free delivery - 1,000 cfm

motor horsepower - 150

10.8 Area "Y" - Yard:

10.8.1 Clay Truck:

Autocar Model RDF302

Wheel Base - 193.

Engine - Cummins H.R.B. 600 (165 hp).

Transmission - 5C72, direction in 5th 8031 G auxiliary, 3 speed.

Tires - 1.000 x 20 - 12 ply heavy duty express 750 V rims.

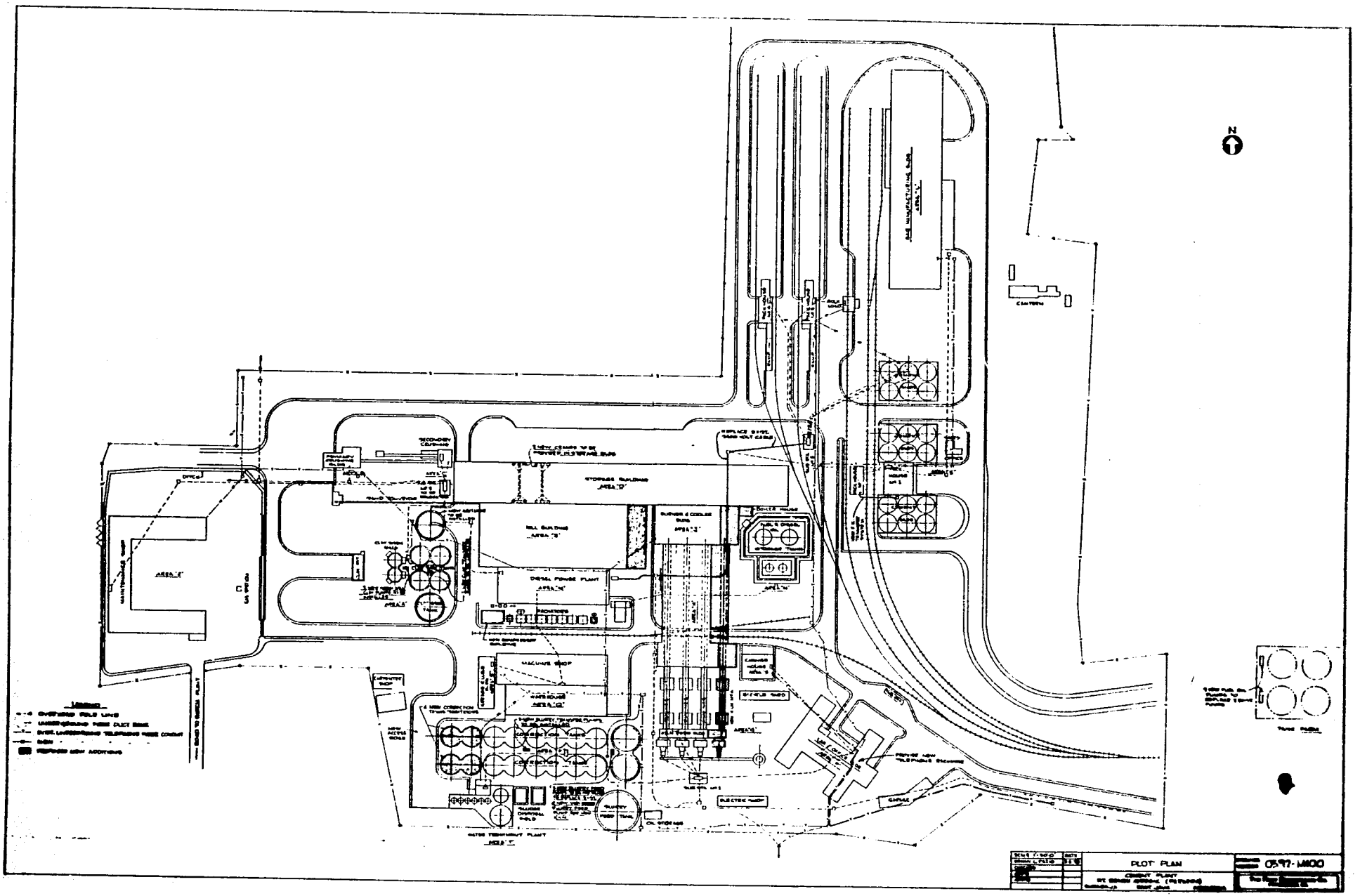
Fuel System - single 70 gallon left submounted.

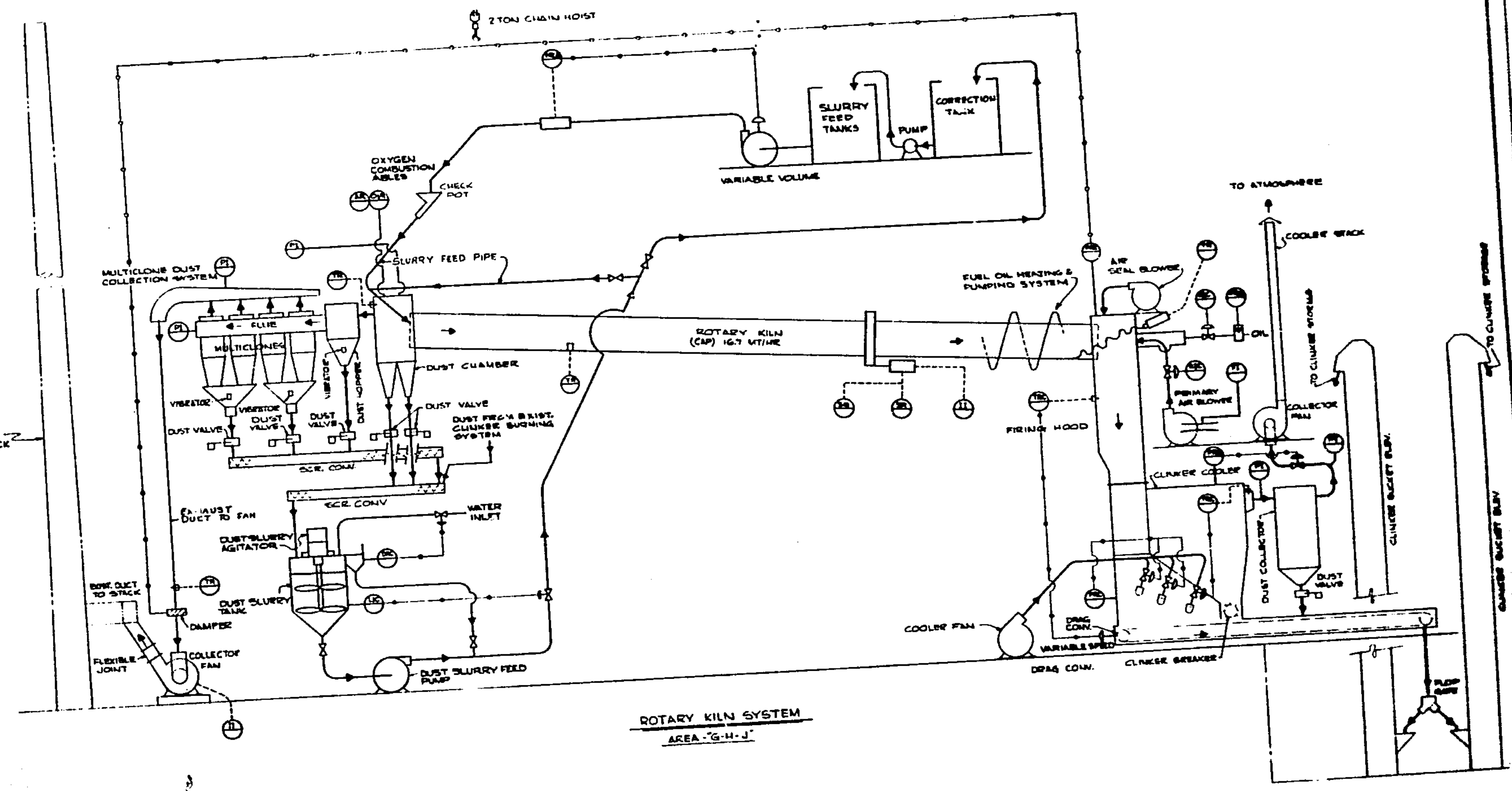
Brakes - air

Chaise - heavy duty frame and springs, brush guard.

10.8.2 Crawler Crane:

P & H Model 955A, with diesel engine.


N
PLOT PLAN
CEMENT PLANT
BY GENERAL CONSULT (PATNAGAR)
0597-M100
CANTEEN
STORAGE BUILDING
MILL BUILDING
DIESEL POWER PLANT
MACHINE SHOP
WAREHOUSE
BOILER HOUSE
ELECTRIC SHOP
WATER TREATMENT PLANT
OIL STORAGE
GARAGE
TRANS FORMER
MAINTENANCE SHOP
OFFICE
SECONDARY CRUSHING
PRIMARY CRUSHING
BULK SILOS
ROAD TO PARIGI PLANT



ROTARY KILN SYSTEM

AREA "G-H-J"

GRAPHIC SCALE

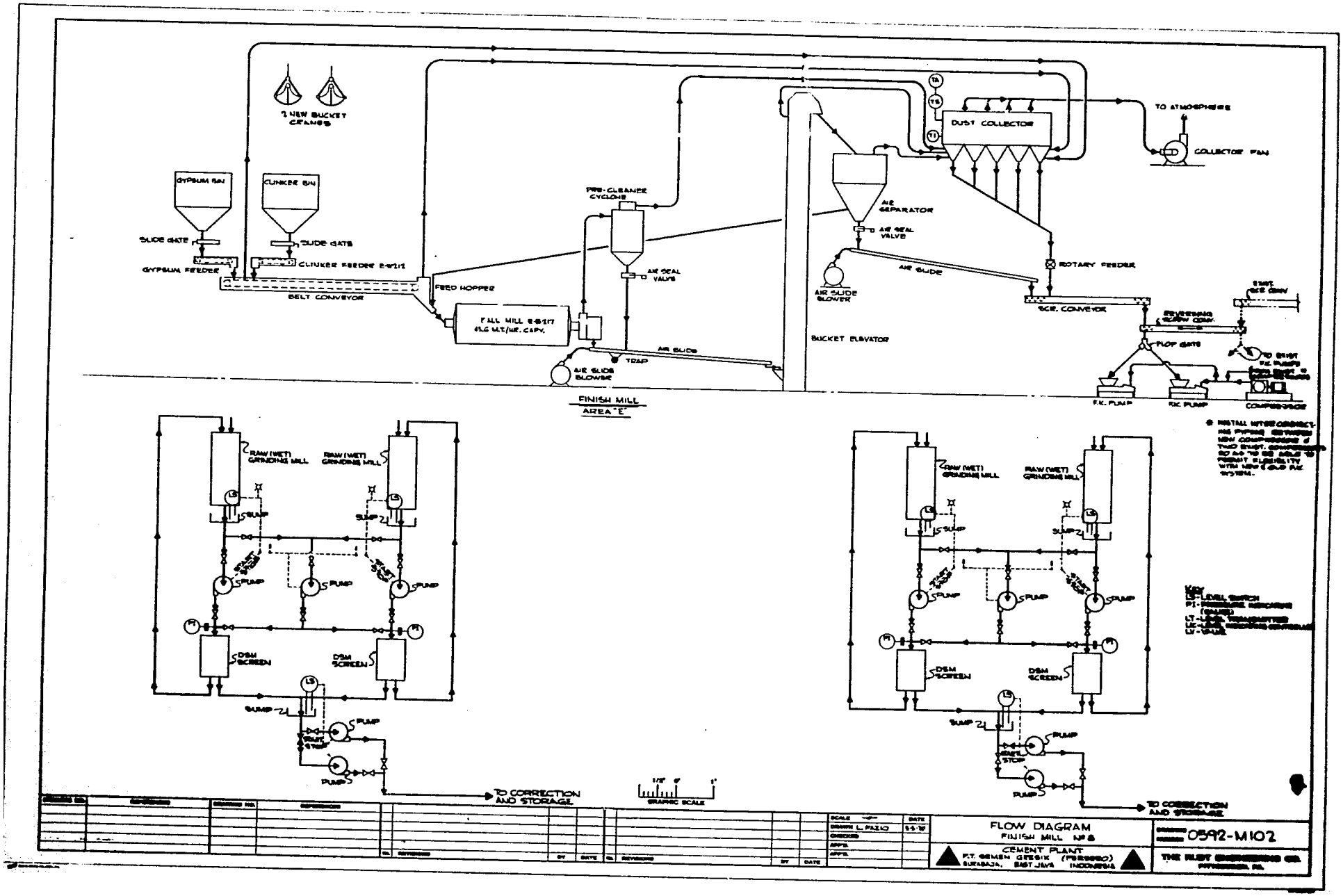
SCALE	DATE
DRAWN L. FAZIO	8-5-70
CHECKED	
APP'D.	
APP'D.	

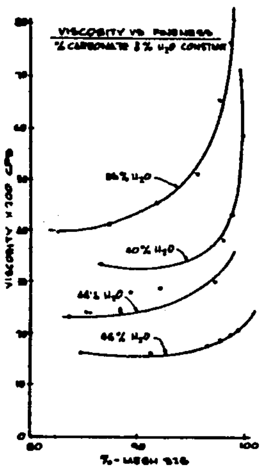
FLOW DIAGRAM
ROTARY KILN SYSTEM NO 4

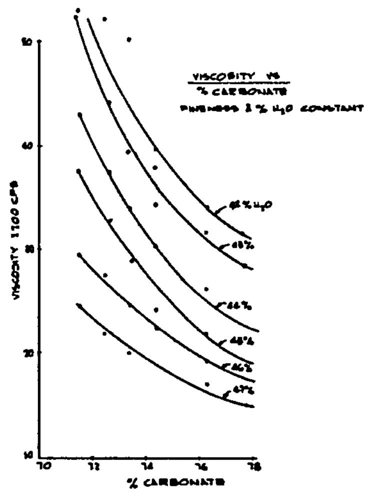
CEMENT PLANT
P.T. SEMEN GRESIK (PERSERO)
SURABAJA, EAST JAVA INDONESIA

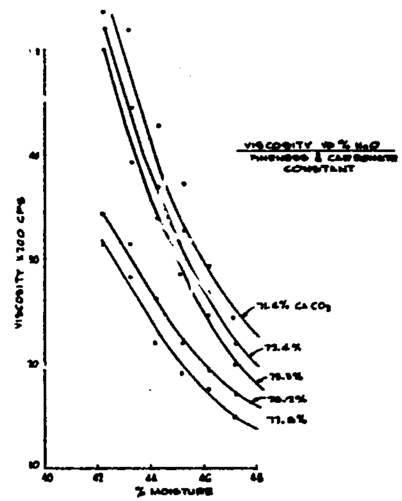
0592-M101

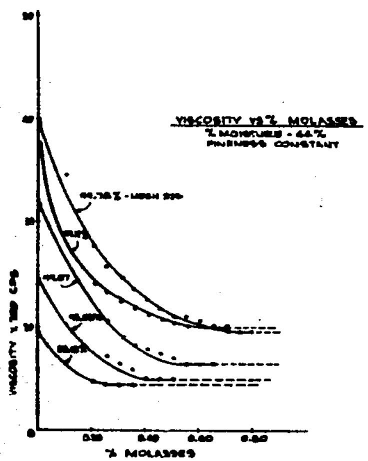
THE

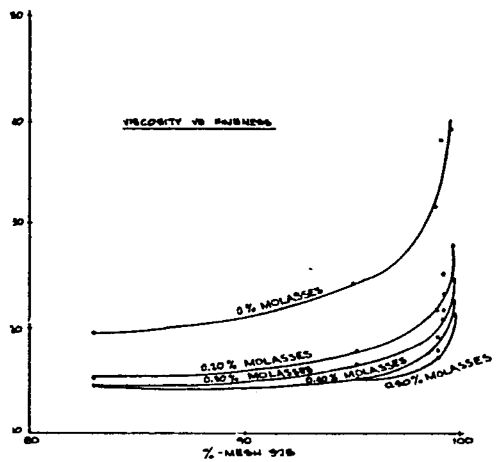

2 NEW BUCKET CRANES
GYPSUM BIN
CLINKER BIN
SLIDE GATE
SLIDE GATE
GYPSUM FEEDER
CLINKER FEEDER
BELT CONVEYOR
FEED HOPPER
FINISH MILL
PRE-CLEANER CYCLONE
AIR SEAL VALVE
TRAP
AIR SLIDE
AIR SLIDE BLOWER
AIR SEPARATOR
AIR SEAL VALVE
AIR SLIDE
AIR SLIDE BLOWER
BUCKET ELEVATOR
DUST COLLECTOR
TO ATMOSPHERE
COLLECTOR FAN
ROTARY FEEDER
SCR. CONVEYOR
REVERSING SCREW CONV.
FLOP GATE
F.K. PUMP
R.K. PUMP
COMPRESSOR
FINISH MILL
AREA "E"
RAW (WET) GRINDING MILL
RAW (WET) GRINDING MILL
SUMP
PUMP
DSM SCREEN
DSM SCREEN
TO CORRECTION AND STORAGE
GRAPHIC SCALE
KEY
LS - LEVEL SWITCH
TO CORRECTION AND STORAGE
FLOW DIAGRAM
FINISH MILL NO 8
CEMENT PLANT
P.T. SEMEN GRESIK (PERSERO)
SURABAYA, EAST JAVA INDONESIA
0592-M102
THE FULLER ENGINEERING CO.







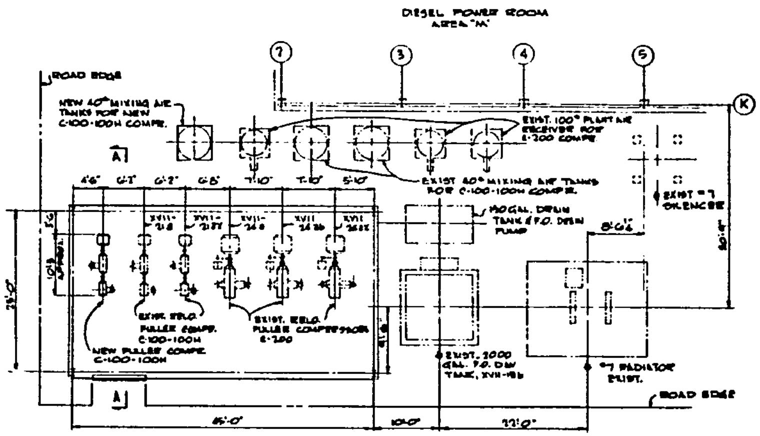




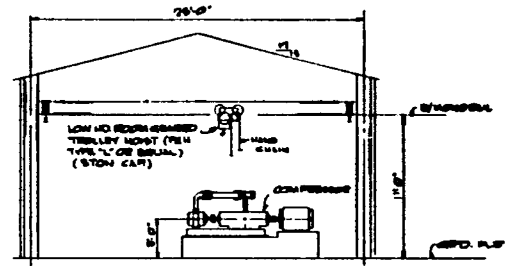
SLURRY VISCOSITY CURVES

CEMENT PLANT
GRESIK, EAST JAVA, INDONESIA

0592-M103



PLAN
NEW AIR COMPRESSOR BUILDING
SCALE 1/8"=1'-0"



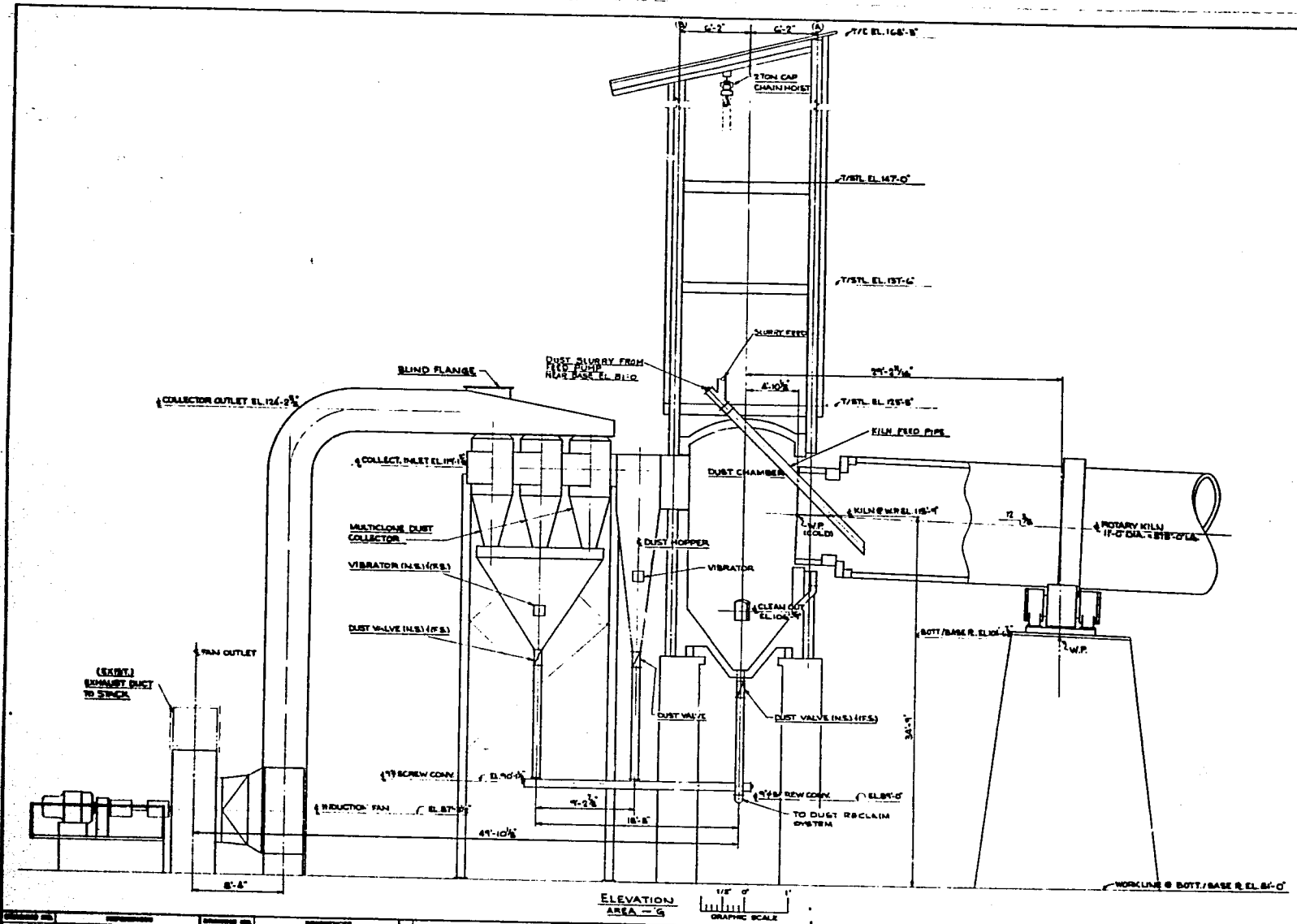
SECTION "A-A"
SCALE 1/8"=1'-0"

SCALE N.N.	DATE
DRAWN L. PASIC	7-22-76
CHECKED	
APP'D.	
APP'D.	

PLAN - AREA-"M"
PLANT AIR - COMPRESSOR BUILDING

CEMENT PLANT
P.T. SEMEN GRESIK (PERSERO)
TUBAN, EAST JAVA, INDONESIA

0592-M104



DRAWING NO.	REFERENCES	DRAWING NO.	REFERENCES

NO.	REVISIONS	BY	DATE	NO.	REVISIONS	BY	DATE

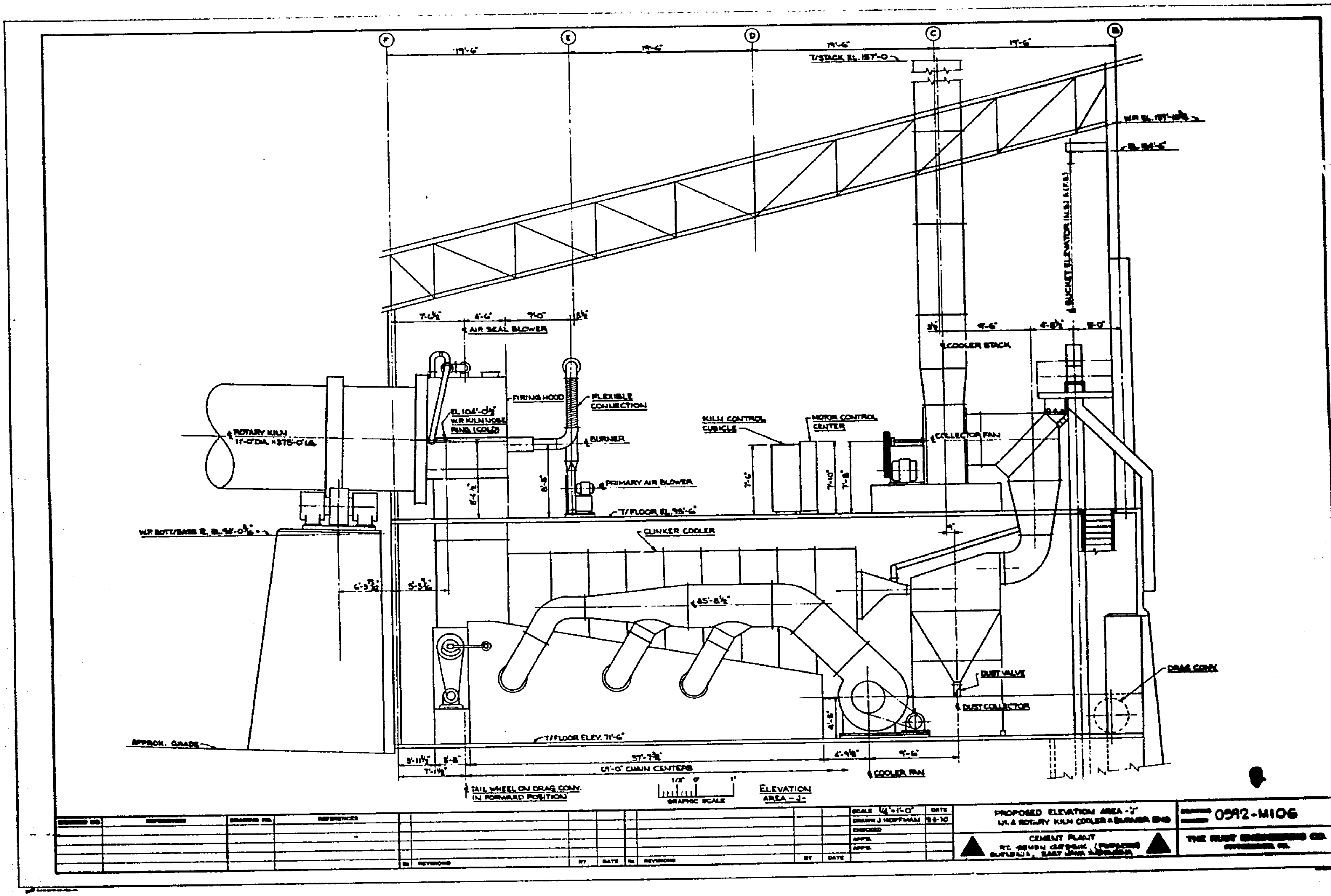
SCALE 1/4" = 1'-0"	DATE	
DRAWN J. HOFFMAN	5-8-70	
CHECKED		
APP'D.		
APP'D.		

PROPOSED ELEVATION AREA - "G"
NO. 4 ROTARY KILN FEED END

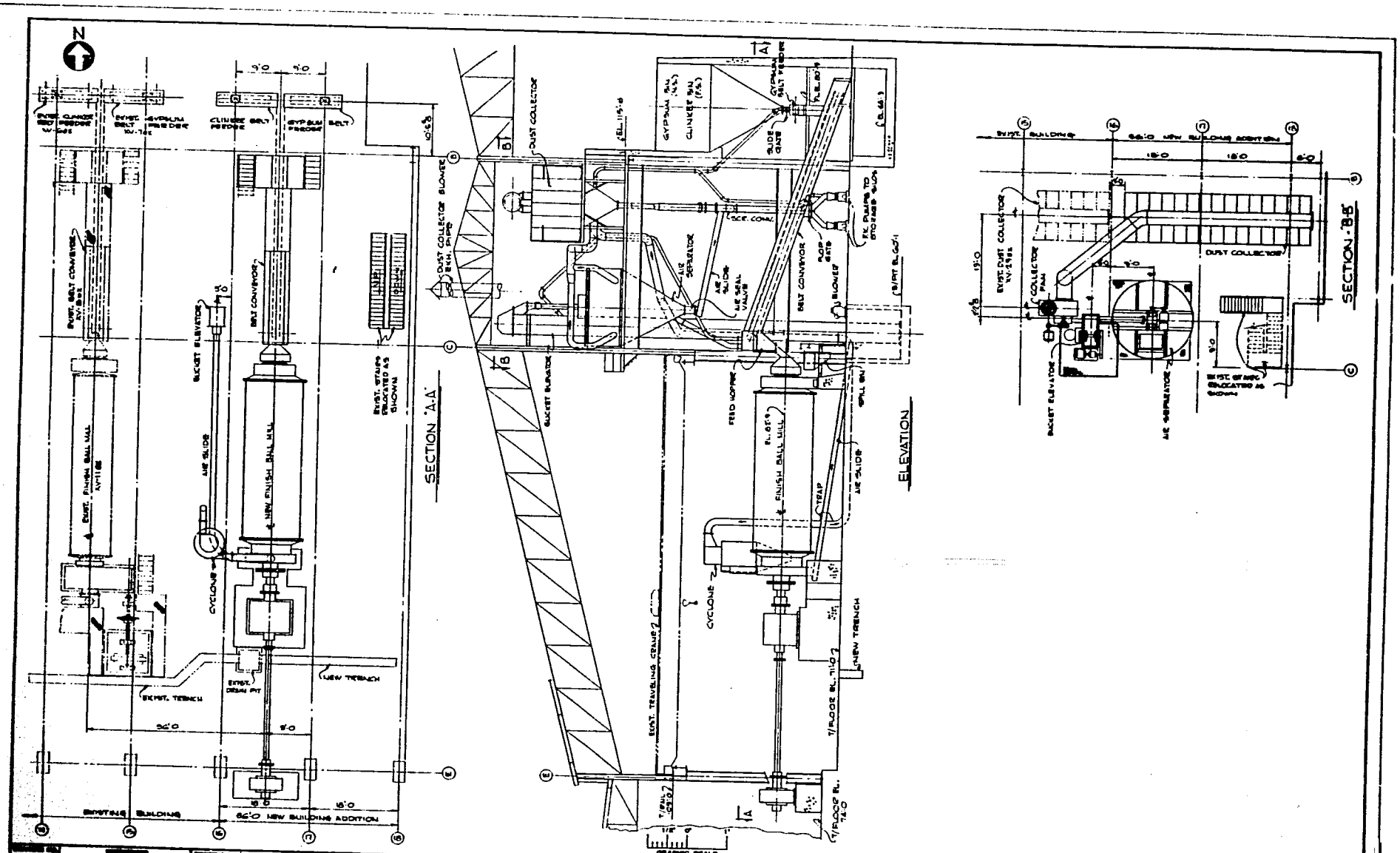
CEMENT PLANT
PT. SEMEN GRESIK (PERSERO)
GURESIK, EAST JAVA INDONESIA

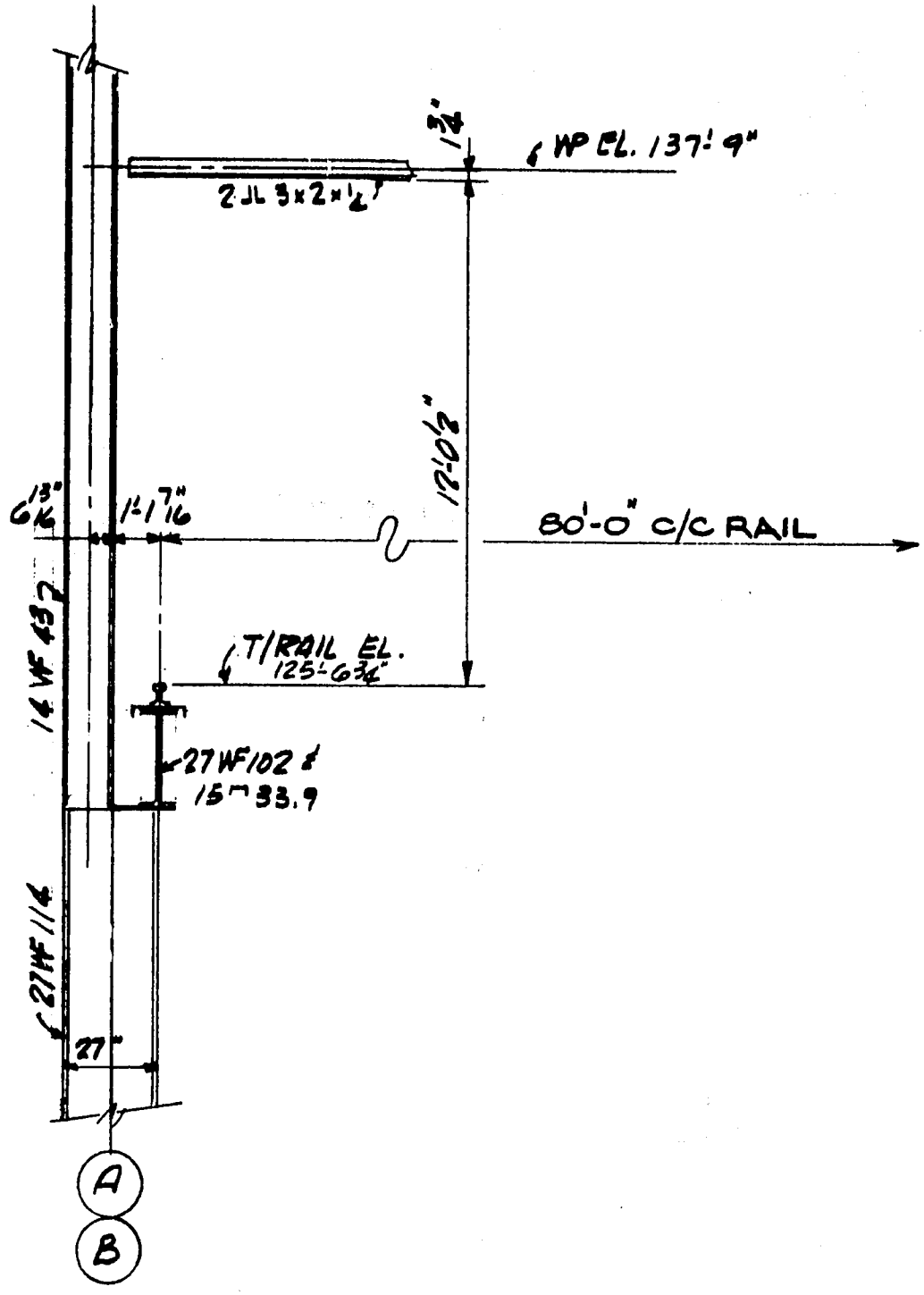
DRAWING NUMBER 0592-M105

THE FULLER ENGINEERING CO.
PITTSBURGH, PA.



T/STACK EL. 157'-0
W.P. EL. 197'-10½
EL. 184'-6"
BUCKET ELEVATOR
AIR SEAL BLOWER
COOLER STACK
FIRING HOOD
FLEXIBLE CONNECTION
EL. 104'-0½" W.P. KILN NOSE RING (COLD)
ROTARY KILN 11'-0" DIA. × 375'-0" LG.
BURNER
KILN CONTROL CUBICLE
MOTOR CONTROL CENTER
COLLECTOR FAN
PRIMARY AIR BLOWER
T/FLOOR EL. 95'-6"
CLINKER COOLER
APPROX. GRADE
DUST VALVE
DUST COLLECTOR
DRAG CONV.
T/FLOOR ELEV. 71'-6"
57'-7⅞"
69'-0" CHAIN CENTERS
COOLER FAN
TAIL WHEEL ON DRAG CONV. IN FORWARD POSITION
GRAPHIC SCALE
ELEVATION AREA - J -
SCALE ¼" = 1'-0"
DRAWN J. HOFFMAN
CHECKED
REVISIONS
BY
DATE
PROPOSED ELEVATION AREA -"J"
ROTARY KILN COOLER & BURNER END
CEMENT PLANT
EAST JAVA INDONESIA
0592-M106


SECTION 'A-A'
ELEVATION
SECTION 'B-B'
EXIST. BELT CONVEYOR
EXIST. FINISH BALL MILL
NEW FINISH BALL MILL
BUCKET ELEVATOR
BELT CONVEYOR
AIR SLIDE
CYCLONE
EXIST. DRAIN PIT
NEW TRENCH
EXIST. TRENCH
EXISTING BUILDING
56'-0 NEW BUILDING ADDITION
DUST COLLECTOR
DUST COLLECTOR BLOWER
EXIST. STAIRS RELOCATED AS SHOWN
CLINKER BIN
GYPSUM BIN
GYPSUM BELT FEEDER
CLINKER BELT FEEDER
SLIDE GATE
AIR SEPARATOR
AIR SEAL VALVE
FLOP GATE
BLOWER
FEED HOPPER
SPILL BIN
TRAP
EXIST. TRAVELING CRANE
T/FLOOR EL. 71'-0
T/FLOOR EL. 74'-0
GRAPHIC SCALE
EXIST. BUILDING
56'-0 NEW BUILDING ADDITION
EXIST. DUST COLLECTOR
COLLECTOR FAN
BUCKET ELEVATOR
AIR SEPARATOR
EXIST. STAIRS RELOCATED AS SHOWN
PROPOSED PLANS & ELEVATION
FINISH MILL NO. 8 AREA "E"
CEMENT PLANT
P.T. SEMEN GRESIK (PERSERO)
GRESIK, EAST JAVA INDONESIA
0592-M107
THE RUST ENGINEERING CO.
PITTSBURGH, PA.



STORAGE BUILDING CRANE CLEARANCE DIAG.			SCALE 1/8"=1'-0"	DATE	0592-M1[illegible]
			DRAWN BY [illegible]		
			CHKD. BY		
FOR P.T. SEMEN GRESIK (PERSERO) AT [illegible] EAST JAVA IND.			APD.		
			APD.		D
	QTY	DATE	[illegible]		

4970198 (6)
PD-AAD-765

PRO AG

PROJECT AGREEMENT

BETWEEN THE DEPARTMENT OF STATE, AGENCY FOR INTERNATIONAL DEVELOPMENT (AID)
AN AGENCY OF THE GOVERNMENT OF THE UNITED STATES OF AMERICA, AND

DEPARTMENT OF AGRICULTURE

AN AGENCY OF THE GOVERNMENT OF THE REPUBLIC OF INDONESIA

Under the terms of the Economic Cooperation Agreement signed October 16, 1950, as amended, and the agreements and provisions noted below, it is agreed to carry out a project in accordance with the terms set forth herein.

☐ Agreement (Specify) .....

☒ Standard Provisions Annex. ☐ other (Specify) ..... 11p.

1. Project No. 497-0198	2. Agreement No. FY 77-8; Oblig. 70309	3. Original ☒ or Revision No. .....
4. Project/Activity Title Agricultural Research		5. Project Descrip. (Annex A)
6. Appropriation 72-11X1023	7. Allotment 402-50-497-00-69-71	

8. AID DOLLAR FINANCING (Cost Component)	PREVIOUS TOTAL (A)	INCREASE (B)	DECREASE (C)	TOTAL TO DATE (D)
a. PERSONNEL COSTS				
(1) U.S.				
PASA				
Contract		572,950		572,950
(2) LOCAL AND TCN				
PASA				
Contract				
b. PARTICIPANTS				
AID DIRECT				
PASA/Contract		238,800		238,800
c. COMMODITIES				
AID Direct				
PASA/Contract		43,600		43,600
d. OTHER COSTS		60,000		60,000
AID Direct				
PASA/Contract		7,200		7,200
e. TOTAL (ALL COSTS)		922,550		922,550
9. LOCAL CURRENCY FINANCING ($1.00 = Rupiah 414.5)				
a. U.S. - OWNED RUPIAH				
b. GOI TRUST FUND (AID ADM.)				
c. GOI - (SHOW SOURCE BELOW)		70,000		70,000

10. REFERENCES AND REMARKS The funds obligated in this Agreement are intended to be used to finance extension of the IRRI contract AID/ead-185 to February 8, 1980. This agreement includes the following:see page 2.

11. DATE OF ORIGINAL AGREEMENT	12. DATE OF THIS REVISION	13. ESTIMATED FINAL CONTRIBUTION DATE
August 15, 1977		Feb. 8, 1980

14. FOR THE COOPERATING GOVERNMENT OR AGENCY	15. FOR THE AGENCY FOR INTERNATIONAL DEVELOPMENT
SIGNATURE	SIGNATURE
TITLE SEC. GEN. GOI AGR. DATE	TITLE A/DIR USAID/Indone DATE 8/15/77

Ir. Sadikin Soemintawikarta
Head, Litbang

Dr. Pasti Hakim
Director, CRIA

USAID CLEARANCE
PRO
CONTR
AGR

Block 10

References and Remarks (continued):

Special Provision: "The co-operating Government Agency agrees to execute an assignment to A.I.D. upon request, of any cause of action which may accrue to the Co-operating Government Agency in connection with or arising out of the contractual performance or breach of performance by a party to a direct contract with A.I.D. financed in whole or in part out of funds provided by the United States Government under this Agreement."

PROJECT DESCRIPTION

I. Project Purpose:

To provide competent scientists who will supplement the limited staff of the Central Research Institute for Agriculture (CRIA), to develop and continue adaptive research on rice breeding, pest control, cultural practices and cropping systems which will improved the productivity of arable lands for cultivating rice and appropriate food crops; strengthen CRIA by supporting training of professional staff; and disseminate new technology to agriculture education and extension organizations.

II. Status of Project:

The initial period covered by the IRRI contract (1972-1977) has been effectively used by CRIA/IRRI to evaluate the performance of improved rice varieties imported from IRRI and those resulting from the CRIA breeding program. The incidence and significance of serious pest and diseases of rice have been evaluated, as has varietal adaptation to lower temperatures at high elevations, length of growing season, and the role of secondary crops in rice farming systems. Important opportunities for increasing yields have become evident, and at least one year of trials conducted on farmers' fields indicate the direction for further evaluation and modification to suit small farmer capabilities and interests. For upland agriculture, there have been detailed CRIA/IRRI studies made of various farming systems with complex inter-planting of crop species to supplement rice and to produce year-round harvests of suitable food crops. The early testing of economic benefits from the better cropping systems are rather spectacular and could virtually revolutionize farming practices if subsequent and more extensive field testing under actual farm conditions confirms the early results of 1975-76 trials.

In 1976 five improved rice varieties were released, each of which has increased yields more than 20 per cent above traditional types. Two possess increased cold tolerance (for higher altitudes), one is resistant to tungro virus, one is strongly tolerant of brown plant hopper attacks, and one is early maturing. A fairly large volume of breeding material with superior characteristics has been carried to advanced stages that could lead to release of additional new varieties for commercial production in the next three years.

The IRRI program has assisted with the identification and placement of trainees. The overall status at the beginning of 1977 is given in the following table:

	PhD	MS	Rice Prod	Cropping Systems	GEU*	Others	Total
Completed	5	4	12	31	15	21	88
In-progress	6	7	-	10	-	-	23
Planned	4	8	10	8	6	3	39
Total	15	19	22	49	21	24	

* Genetic Evaluation and Utilization

Although considerable progress has been made in strengthening research programs and improving staff qualifications, the planned development of a National Center for rice and secondary crops research is behind schedule, and program planning for present and proposed regional stations will absorb more of the CRIA scientific and administrative resources. The GOI wishes to retain IRRI services for three years beyond project termination date of 8 February 1977. Availability of the IRRI team for this period will contribute both to ultimate establishment of the National Center (with World Bank assistance) and the Sumatra Research Project (with AID assistance).

III. Conditions to be Expected at End of Project:

A. Condition: Research Scientists and technicians trained and in place, to continue on-going research and initiate new research projects.

Evidence to date:

A total of 9 higher degrees have been attained over 1972-1976, and 79 individuals trained in specialized courses. A further 20 higher degrees are in progress, of which 13 will complete training by 1979 and 7 in 1980. An additional 12 are scheduled for training. Under the current project extension, funding is budgeted under the contract for 18 manyears of academic training and 5 manyears of short-term specialized training.

B. Condition: Greater competence built into CRIA to support adaptive research.

Evidence to date:

IRRI scientists have been and will continue to be utilized to strengthen current research programs and to design and implement new ones. Senior Indonesian scientists have been and will continue to be involved in IRRI's international rice programs. IRRI consultants, under the contract, will continue to be available to consult on emergency problems.

C. Condition: Jointly planned and implemented agricultural research program among Indonesia's agricultural institutions and universities.

Evidence to date:

The National Rice Research Program (NRRP) has been superceded by the development of the National Rice Research Project (effective 1975), which falls within the structure of the Agency for Agricultural Research and Development (ARD) created

April 1975. By putting the National Rice Research Project within one agency, the budgetary problems which confounded the NRR Program were resolved. The extension education, marketing and post harvest technology components included in the NRR Program were not included since CRIA's expertise lay within crop improvement, production, protection, farm management and production economics. Where expertise within the NRR Project does not exist, the Project administration has endeavored to cooperate, and even contract with, university staff and other units which do have the expertise necessary to undertake priority investigations.

Linkages with educational institutions are improving. At the regional research level, in West Sumatra, CRIA has an active working relationship with the agriculture extension service, Andalas University and the provincial planning board (BAPPEDA). This consists of an Advisory Board which establishes policy and makes recommendations to a Technical Team for Agricultural research programs. The chairman of the Board is the Province Governor; the vice-chairman is the Province Agriculture Inspector; and members are representatives of BAPPEDA, Andalas University, the extension service, and CRIA. The Technical Team is composed of a chairman represented by CRIA, with members representing the extension service and the university.

Research planning has been significantly improved. Each year the central administration and each department of CRIA develop detailed research programs, staff expansion programs, and building programs. These programs have provided the justification for the substantial budgets allocated to CRIA in recent years. In January 1976, the CRIA staff, together with scientists from the universities and other government agencies, reviewed the CRIA research administration process with reference to 1) problem identification, 2) research strategies, 3) program direction, and 4) organizational development. The proceedings from this review have been published by CRIA as "The Strategy and Development of Food Crops Research."

D. Condition: Research results are adopted by farmers through extension and information services.

Evidence to date:

To date five new rice varieties have been released. Distribution of new varieties and acceptance by farmers is demonstrated by the following data:

Harvested Area (%)

Year	HYV	I.T.	T.
1972	31.0	24.5	44.5
1975	51.3	10.9	37.8

HYV = High Yielding Variety
IT = Improved traditional
T = Traditional

With 51 per cent, or two million hectares, of the areas under BIMAS intensification, and with average farm size of four-tenths hectare, five million farm families have realized a 20 per cent increase in rice production.

Cropping systems research, initiated 1973, has become an integral part of CRIA's endeavor. The research methodology developed is being implemented on new transmigration schemes to determine suitable cropping patterns and recommendations for soil and pest management under a contract between the Ministry of Transmigration and CRIA.

The GOI has made comprehensive changes in its extension and information dissimination services, with the objective of improving staff qualifications and strengthening the services provided to the agricultural community. Increasing the number of staff is an important component of this program, and World Bank funding is being provided to establish training programs for new extension and information service personnel.

In 1977, CRIA established an Office of Information Services to strengthen its publication services and training activities for such agencies as BIMAS and the Directorate of Production Development. A USAID/IRRI participant, who returned to Indonesia in December 1976 with a PhD degree, has been given

the responsibility of this new Office. The project extension will provide funding for IRRI Consultant services and commodities to support the Office.

IV. Output Target: 1977 - 1980

The IRRI contract will continue to assist CRIA with technical assistance in rice breeding, agronomy, economics and consultant services; academic and short-term training; and commodities--with the following targets:

A. Irrigated Agriculture (Intensification): Rice breeding, cropping systems, pest and disease control, secondary crops, grain quality, cultural practices, fertilization.

B. Upland Agriculture (Extensification): Rice breeding, cropping systems, pest and disease control, secondary crops, cultural practices, tolerance to cool weather and problem soils, soil improvement.

C. Office of Information Services: Research information dissemination, visual aid preparation, graphics, editing and layout, equipment operation, bulletins, reports.

D. Staff Training: MS and PhD training abroad, specialized short-term training abroad, extension training, seminars, workshops.

E. Networks, Linkages and Feedback: Geographic emphasis and appropriate technology for the particular agro-climatic area, variety dissemination, extension, field trials.

F. Commodities and Equipment: Direct support to the scientific staff and to supplement equipment for the new Office of Information.

V. Inputs

A. The Government of Indonesia through the Agency for Agricultural Research and Development and CRIA, agrees to provide:

1. At least one counterpart for each USAID-provided contract scientist.

2. Suitable office space, office furniture, and miscellaneous office supplies for each contract scientist.

3. Houses for permanent contract scientists and their families in Bogor.

4. Allowances and wages for CRIA staff, at levels sufficient to permit full time to research and training assignments, including extensive project-related in-country travel.

5. Those requirements as stated in the "Basic Commodity Provisions" incorporated in the original Project Agreement signed 30 June 1971.

6. Routine and development budget support for, but not limited to, such items as: travel and per diem for GOI staff: honoraria: travel and per diem for participant trainees; procurement of production equipment for routine work and testing; personnel, salaries and research budget support for land, buildings and equipment and funds for national and regional meetings, seminars, and conferences as well as the regular and usually budgeted items of the GOI Routine and Development budget.

7. A medium range (3-5 years) organizational development plan that includes the personnel, physical facilities and financing which will be needed to assure CRIA's ability to carry on its research activities independent of outside assistance. The plan should be submitted to A.I.D. within six months after the signing of this Project Agreement. A joint AID/CRIA evaluation of this project at the end of this extension period will, among other things, assess progress against the plan in organizational development.

B. The U.S. Government, through the Agency for International Development, agrees to provide:

1. Technicians:
Continued financial support for the contract with IRRI for three research scientists. (See Attachment A for budget details):

1 - Plant Breeder
1 - Agronomist
1 - Agricultural Economist

The incumbent Plant Breeder will continue to act as coordinator for the USAID-provided team in program documentation and reporting.

2. Commodities:

Commodities will be funded under the contract (see Attachment A for budget details), and will primarily provide equipment for the new Office of Information. Other requirements include traction equipment, laboratory germinators and operating supplies. The original staff vehicles provided at the outset of the project now record over 60,000 miles and require constant maintenance; allowance is made for the replacement of three vehicles.

3. Participant Training:

A participant training program will be funded and administered under the contract for 18 man-years of academic training abroad; 5 man-years of short-term specialized training abroad; stipends and travel funds for in-country training and workshops; and funds for English language training.

4. The Agricultural Development Officer, or his designee, will be the Project Manager and will be responsible for administration of USAID's support to the project. The Project Manager will maintain constant liaison with the contractor's team leader, appropriate Department of Agriculture officials, and other donor agencies.

C. GOI Rupiah Trust Funds Administered by USAID

In accordance with established procedures between the GOI and USAID. Trust Funds will be utilized by this project. However, due to the uncertainty of the extension of the project, no Trust Funds were allocated for FY 77, and the dollar funding for the first year of the project extension includes $ 60,000 for local currency costs.

Attachment B provides Trust Fund budget details.

Project Budget *

(U.S. Dollars)

Attachment A

U.S. Dollars		1st Year	2nd Year	3rd Year	Total
1. Direct Salaries		73,000	76,700	80,500	230,200
2. Fringe Benefits (Retirement & Insurance)		16,400	17,300	18,100	51,800
3. Allow (Post diff, cost of living, school)		20,500	21,575	22,675	64,750
4. Travel, Transportation & Per Diem including travel of counterparts to conferences in Asia	a.	13,500	14,400	15,300	
	b.	8,000	-	24,000	
	c.	4,500	8,000	6,600	
	d.	4,000	1,500	1,500	
		30,000	23,900	47,400	101,300
5. Equipment & Supplies		35,500	4,100	4,000	43,600
6. Consultant salaries		25,000	12,500	12,500	50,000
7. Training (18 man-year academic)		40,000	81,000	41,000	
5 short-term overseas		17,500	17,500	17,500	
Incountry stipends & travel		9,200	6,100	3,000	
English language training		3,000	2,000	1,000	
		69,700	106,600	62,500	238,800
8. Other Direct		62,400 **	2,400	2,400	67,200
9. Indirect Costs (9,5%)		25,900	25,200	23,800	74,900
Total		358,400	290,275	273,875	922,550

* Project year begins 15 July 1977.

** Includes $ 60,000 for local currency costs during first year of extension (2.9.77 - 2.10.78) for which no Trust Fund rupiah are available (see Rupiah budget)

Attachment B

Project Budget
(Rupiah, 1000)

Rupiah	1st year	2nd year	3rd year	Total
1. Salaries & wage (local employees)	7,410	8,151	8,966	24,527
2. Vehicle operation, insurance, repairs & maintenance	3,555	3,910	4,302	11,767
3. Supplies	378	416	457	1,251
4. Repairs & maintenance, including exterior and interior painting	990	1,089	1,198	3,277
5. Utilities	2,889	3,178	3,496	9,563
6. Travel (air)	4,838	5,321	5,854	16,013
7. Per diem	4,578	3,435	3,829	11,842
8. Miscellaneous	95	104	114	313
	24,733	25,604*	28,216*	78,553
	($ 59,670)			

*Trust funds are expected to be made available for this project for the second and third year of the project in accord with the above figures.