THE REPUBLIC OF THE PHILIPPINES

FEASIBILITY REPORT
ON
THE GRAIN TERMINAL CONSTRUCTION PROJECTS
IN
MANILA AND CEBU

ANNEXES

MAY 1977

JAPAN INTERNATIONAL COOPERATION AGENCY

THE REPUBLIC OF THE PHILIPPINES

FEASIBILITY REPORT
ON
THE GRAIN TERMINAL CONSTRUCTION PROJECTS
IN
MANILA AND CEBU

ANNEXES

MAY 1977

JAPAN INTERNATIONAL COOPERATION AGENCY

THE REPUBLIC OF THE PHILIPPINES

FEASIBILITY REPORT

ON THE GRAIN TERMINAL CONSTRUCTION PROJECTS

IN MANILA AND CEBU

ANNEX

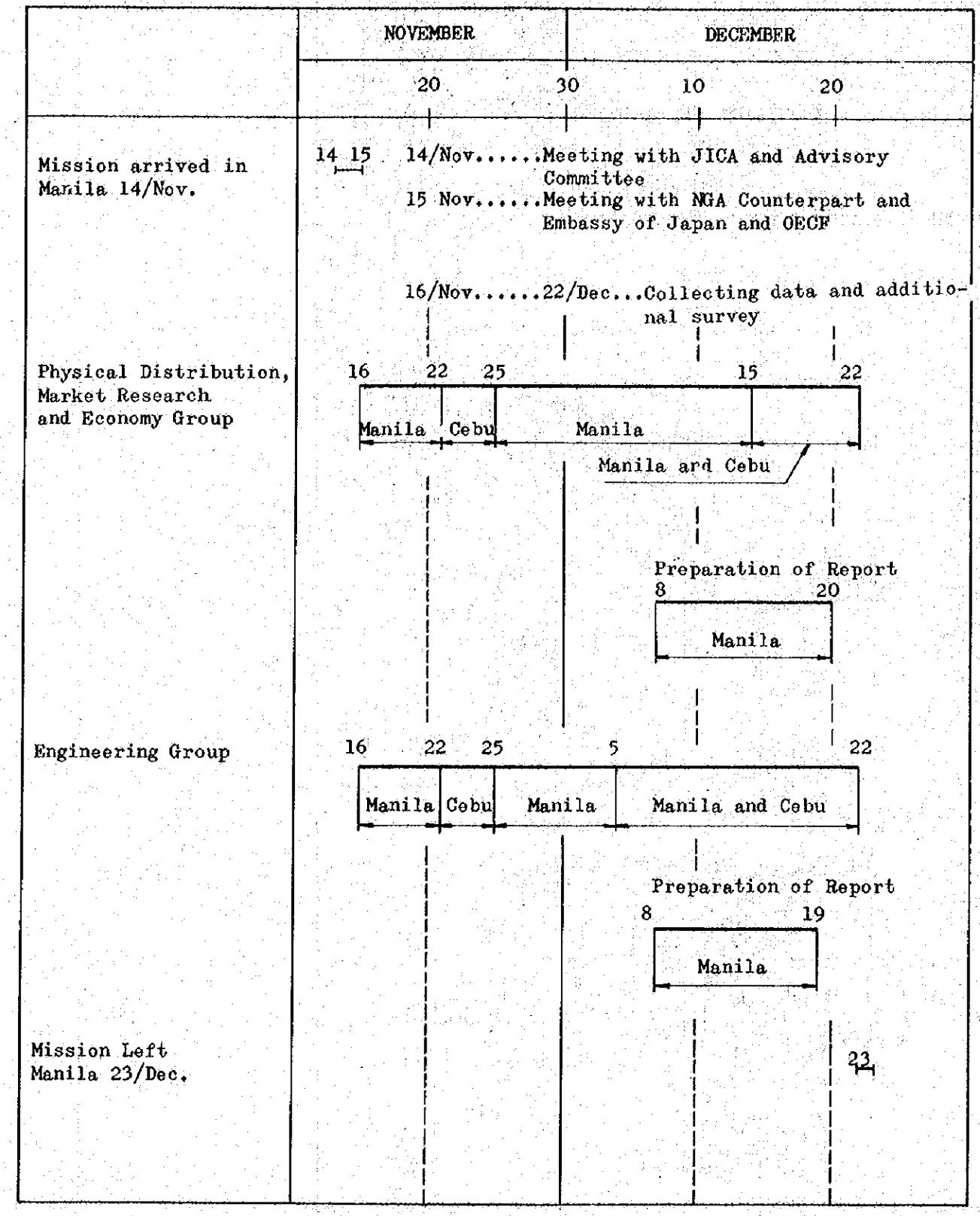
CONTENTS

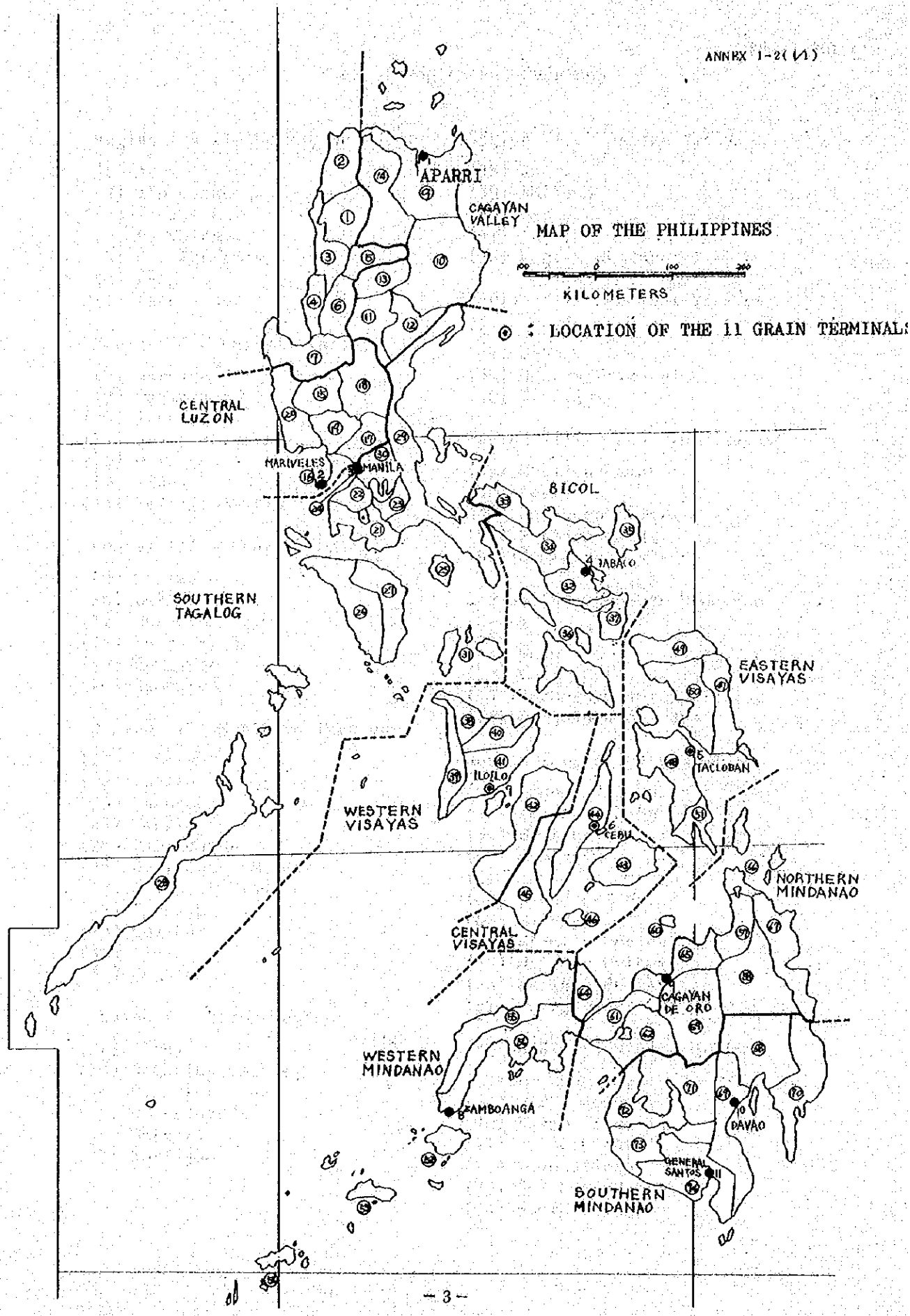
I INTRODUCTION

II PRODUCTION, DISTRIBUTION, PROCESSING AND CONSUMPTION OF THE GRAINS IN THE PHILIPPINES

ANNEX 1-1 (1/1)

ITINERARY OF MISSION




APARRI
CAGAYAN VALLEY
MAP OF THE PHILIPPINES
KILOMETERS
: LOCATION OF THE 11 GRAIN TERMINALS
CENTRAL LUZON
MARIVELES
MANILA
BICOL
LABACO
SOUTHERN TAGALOG
EASTERN VISAYAS
TACLOBAN
ILOILO
WESTERN VISAYAS
CEBU
NORTHERN MINDANAO
CENTRAL VISAYAS
CAGAYAN DE ORO
WESTERN MINDANAO
ZAMBOANGA
DAVAO
GENERAL SANTOS
SOUTHERN MINDANAO

Name of Region and Province

Region I - Ilocos Region

(1) Abra
(2) Ilocos Norte
(3) Ilocos Sur
(4) La Union
(5) Mt. Province
(6) Benguet
(7) Pangasinan

Region II - Cagayan Valley

(8) Batanes
(9) Cagayan
(10) Isabela
(11) Nueva Vizcaya
(12) Quirino
(13) Ifugao
(14) Kalinga-Apayao

Region III - Central Luzon

(15) Tarlac
(16) Bataan
(17) Bulacan
(18) Nueva Ecija
(19) Pampanga
(20) Zambales

Region IV - Southern Tagalog

(21) Batangas
(22) Cavite
(23) Laguna
(24) Manila
(25) Marinduque
(26) Occidental Mindoro
(27) Oriental Mindoro
(28) Palawan
(29) Quezon
(30) Rizal
(31) Romblon

Region V - Bicol Region

(32) Albay
(33) Camarines Norte
(34) Camarines Sur
(35) Catanduanes
(36) Masbate
(37) Sorsogon

Region VI - Western Visayas

(38) Aklan
(39) Antique
(40) Capiz
(41) Iloilo
(42) Negros Occidental

Region VII - Central Visayas

(43) Bohol
(44) Cebu
(45) Negros Oriental
(46) Siquijor

Region VIII - Eastern Visayas

(47) Eastern Samar
(48) Leyte
(49) Northern Samar
(50) Western Samar
(51) Southern Leyte

Region IX - Western Mindanao

(52) Basilan
(53) Sulu
(54) Tawi-tawi
(55) Zamboanga del Norte
(56) Zamboanga del Sur

Region X - Northern Mindanao

(57) Agusan del Norte
(58) Agusan del Sur
(59) Bukidnon
(60) Camiguin
(61) Lanao del Norte
(62) Lanao del Sur
(63) Maranaw
(64) Misamis Occidental
(65) Misamis Oriental
(66) Surigao del Norte
(67) Surigao del Sur

Region XI - Southern Mindanao

(68) Davao de Norte
(69) Davao del Sur
(70) Davao Oriental
(71) North Cotabato
(72) Maguindanao
(73) Sultan Kudarat
(74) South Cotabato

MINDANAO
GEOGRAPHICAL REGION
Case of 4 Regions

WESTERN MINDANAO

(1) Sulu :
(2) Zambo, del Norte :
(3) Zambo del Sur :
(4) Basilan :
(5) Tawi-Tawi :

NORTHEASTERN MINDANAO

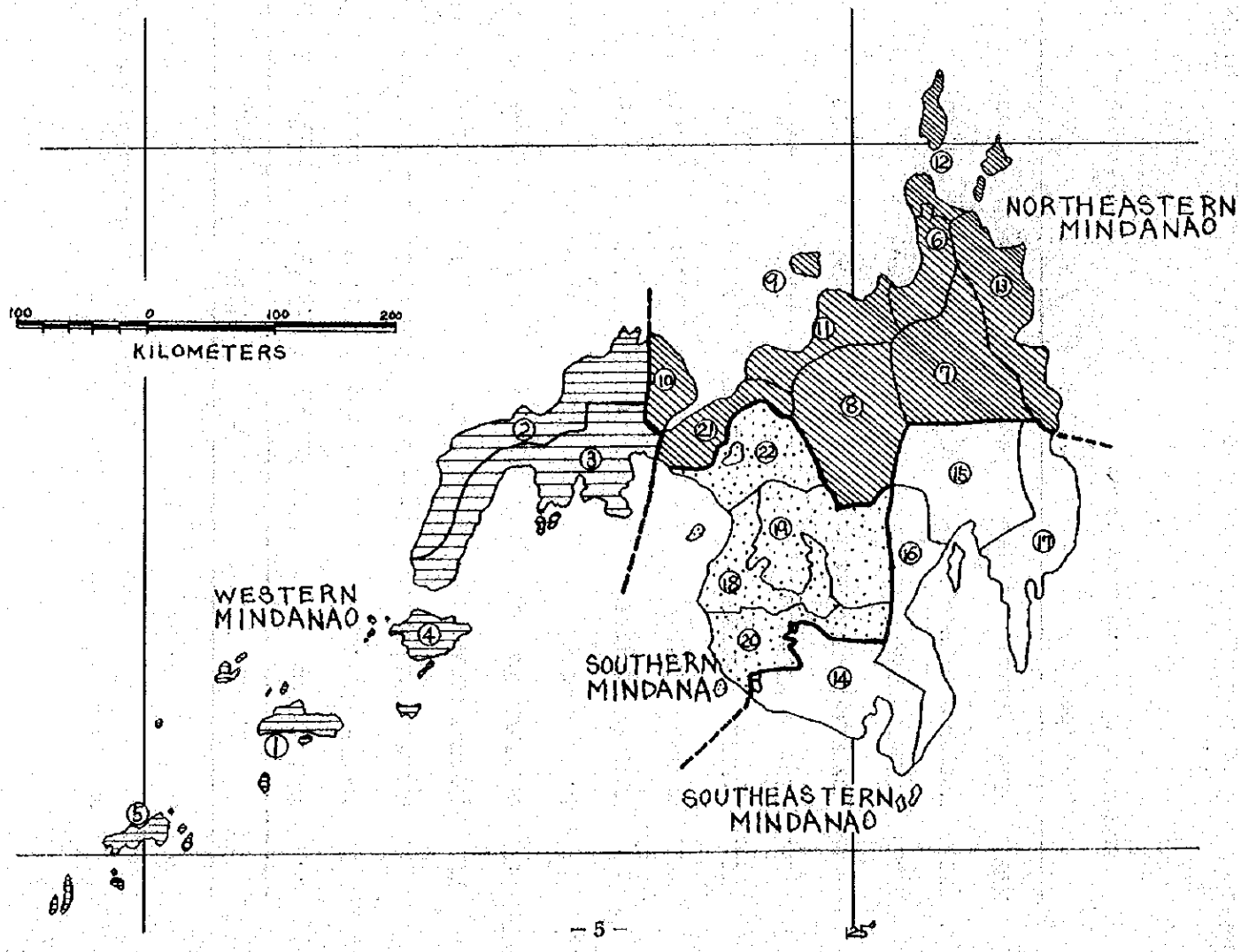
(6) Agusan del Norte :
(7) Agusan del Sur :
(8) Bukidnon :
(9) Camiguin :
(10) Misamis Occ. :
(11) Misamis Or. :
(12) Surigao del Norte:
(13) Surigao del Sur :

SOUTHEASTERN MINDANAO

(14) South Cotabato :
(15) Davao del Norte :
(16) Davao del Sur :
(17) Davao Oriental :

SOUTHERN MINDANAO (CENTRAL MINDANAO)

(18) Maguindanao :
(19) North Cotabato :
(20) Sultan Kudarat :
(21) Lanao del Norte :
(22) Lanao del Sur :



Projected Population By Region

FY 1975-2000

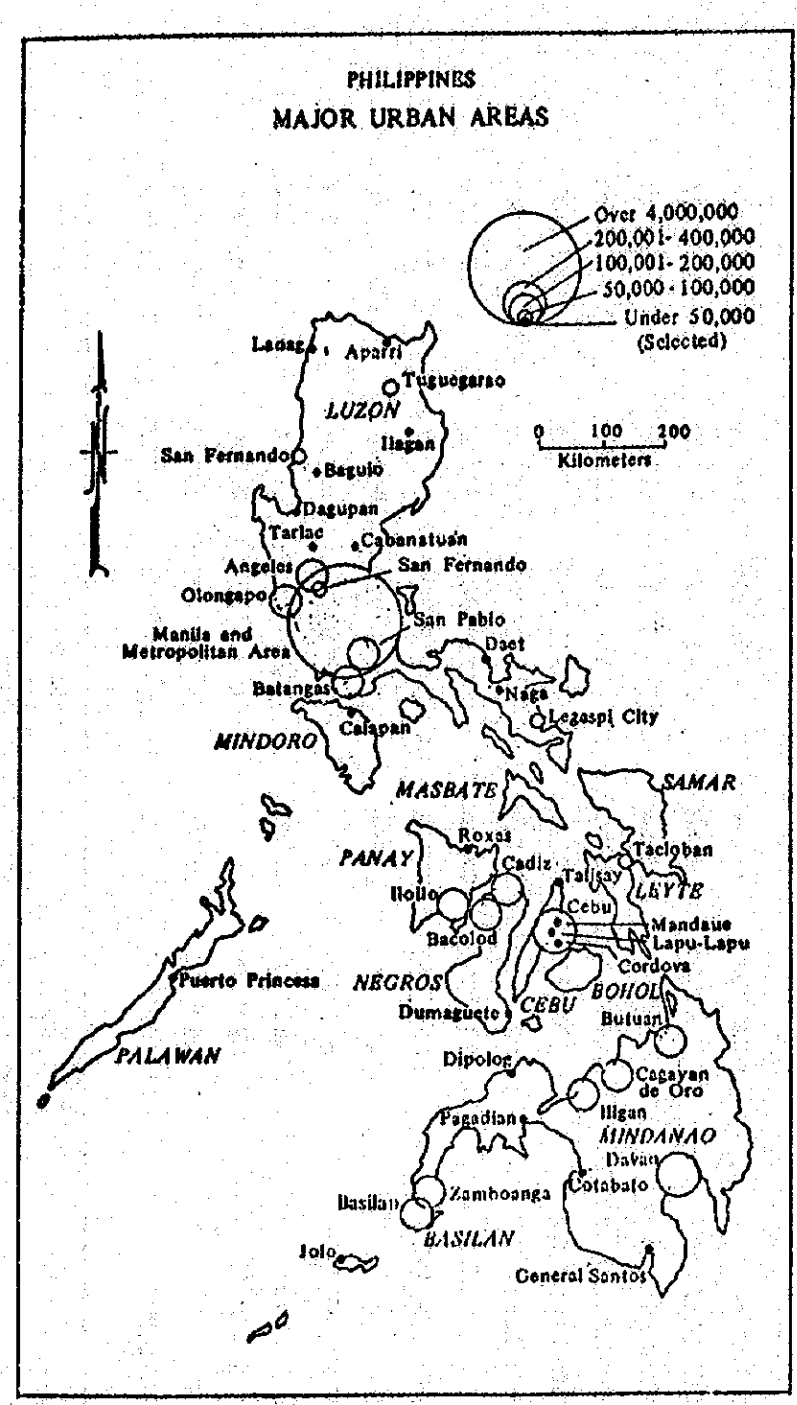
(In Thousands)

	REGION	1975	1976	1977	1978	1979	1980	1981
	PHILIPPINES	42,231	43,294	44,385	45,590	46,707	47,924	49,000
I.	ILOCOS REGION	3,290	3,340	3,391	3,442	3,442	3,547	3,604
II.	CAGAYAN VALLEY	1,918	1,963	2,009	2,057	2,105	2,155	2,203
III.	CENTRAL LUZON	4,234	4,355	4,480	4,609	4,741	4,878	4,997
IV.	SOUTHERN TAGALOG	5,194	5,341	5,485	5,649	5,811	5,977	6,085
V.	BICOL REGION	3,222	3,264	3,308	3,352	3,397	3,442	3,498
VI.	WESTERN VISAYAS	3,869	3,904	3,939	3,975	4,011	4,048	4,105
VII.	CENTRAL VISAYAS	3,346	3,396	3,447	3,498	3,550	3,603	3,667
VIII.	EASTERN VISAYAS	2,505	2,527	2,549	2,571	2,594	2,617	2,645
IX.	WESTERN MINDANAO	2,214	2,279	2,347	2,416	2,487	2,561	2,633
X.	NORTHEASTERN MINDANAO	2,951	3,055	3,164	3,277	3,394	3,516	3,624
XI.	SOUTHEASTERN MINDANAO	2,482	2,595	2,714	2,838	2,967	3,102	3,211
XII.	SOUTHERN MINDANAO	2,069	2,138	2,209	2,282	2,359	2,438	2,511
XIII.	METRO MANILA	4,929	5,129	5,338	5,559	5,791	6,035	6,212
	CEBU PROVINCE	1,838	1,873	1,908	1,943	1,980	2,017	2,057

SOURCE: NCSO, Low Assumption

Prepared by: CORPORATE PLANNING GROUP, NGA

	REGION	1982	1983	1984	1985	1990	1995	2000
	PHILIPPINES	50,140	51,309	52,513	53,834	59,570	64,866	70,025
I.	ILOCOS REGION	3,663	3,723	3,783	3,846	4,095	4,350	4,511
II.	CAGAYAN VALLEY	2,251	2,301	2,353	2,406	2,653	2,867	3,081
III.	CENTRAL LUZON	5,119	5,244	5,372	5,510	6,120	6,643	7,148
IV.	SOUTHERN TAGALOG	6,221	6,360	6,502	6,735	7,483	8,093	8,694
V.	BICOL REGION	3,554	3,612	3,620	3,729	3,983	4,266	4,529
VI.	WESTERN VISAYAS	4,162	4,221	4,280	4,335	4,560	4,837	5,073
VII.	CENTRAL VISAYAS	3,731	3,797	3,863	3,924	4,190	4,495	4,763
VIII.	EASTERN VISAYAS	2,673	2,702	2,731	2,768	2,891	3,026	3,146
IX.	WESTERN MINDANAO	2,705	2,782	2,860	2,934	3,297	3,655	4,007
X.	NORTHEASTERN MINDANAO	3,738	3,854	3,974	4,100	4,701	5,268	5,846
XI.	SOUTHEASTERN MINDANAO	3,323	3,440	3,560	3,688	4,304	4,860	5,430
XII.	SOUTHERN MINDANAO	2,587	2,665	2,745	2,827	3,216	3,595	3,974
XIII.	METRO MANILA	6,406	6,604	6,813	7,026	8,071	8,905	9,757
	CEBU PROVINCE	2,098	2,140	2,183	2,222	2,399	2,588	2,760


PHILIPPINES
MAJOR URBAN AREAS
Over 4,000,000
200,001- 400,000
100,001- 200,000
50,000 - 100,000
Under 50,000
(Selected)
0 100 200
Kilometers
Laoag
Aparri
Tuguegarao
LUZON
Ilagan
San Fernando
Baguio
Dagupan
Tarlac
Cabanatuan
Angeles
San Fernando
Olongapo
San Pablo
Manila and
Metropolitan Area
Daet
Batangas
Naga
Legaspi City
Calapan
MINDORO
MASBATE
SAMAR
Roxas
Tacloban
PANAY
Cadiz
Tallsay
LEYTE
Iloilo
Cebu
Mandaue
Lapu-Lapu
Bacolod
Cordova
Puerto Princesa
NEGROS
BOHOL
CEBU
Dumaguete
Butuan
PALAWAN
Dipolog
Cagayan
de Oro
Iligan
Pagadian
MINDANAO
Davao
Cotabato
Zamboanga
Basilan
BASILAN
Jolo
General Santos

Non-agricultural and Agricultural Population of the Philippines

1970

Region	Non-agricultural Position	%	Agricultural Population	%	Total Population
PHILIPPINES	11,646,459	31.8%	24,944,609	68.2%	36,591,068
ILOCOS	580,011	19.4%	2,406,268	80.6%	2,986,279
CAGAYAN VALLEY	239,064	14.1%	1,450,936	85.9%	1,690,000
CENTRAL LUZON	1,182,981	31.9%	2,527,341	68.1%	3,710,322
SOUTHERN TACALOG	951,524	26.3%	2,668,111	73.7%	3,619,635
BICOL	573,827	19.4%	2,390,335	80.6%	2,964,162
WESTERN VISAYAS	936,923	26.0%	2,643,264	74.0%	3,600,189
CENTRAL VISAYAS	858,080	28.3%	2,170,985	71.7%	3,029,065
EASTERN VISAYAS	469,303	19.7%	1,910,181	80.3%	2,379,484
WESTERN MINDANAO	303,833	16.3%	1,563,763	83.7%	1,867,596
NORTHEASTERN MINDANAO	450,935	20.4%	1,726,345	79.6%	2,207,280
SOUTHERN MINDANAO	483,271	25.0%	1,452,912	75.0%	1,936,183
CENTRAL MINDANAO	308,004	15.9%	1,631,354	84.1%	1,939,358
METRO MANILA	4,258,701	91.3%	402,814	8.7%	4,661,515
Manila & Suburbs	1,323,430	100.0%	0	0%	1,323,430
Cebu Province	657,152	40.3%	974,379	59.7%	1,631,531

Prepared by NGA

PALAY: Estimated Production by Region

FY 1976 - 2000

In 1000 Bags of 50 kg

PARTICULARS	1976	1977	1978	1979	1980
PHILIPPINES[1]	128,011	138,843	148,834	160,789	173,903
Irrigation[2]	9,157	15,284	20,322	27,313	35,368
New Cultivation[3]	2,571	4,162	5,952	7,691	9,444
Extension Work[4]	3,081	6,195	9,358	12,584	15,890
ILOCOS	9,468	9,964	10,469	11,021	11,673
CAGAYAN VALLEY	15,799	17,764	19,526	21,763	24,108
CENTRAL LUZON	25,138	26,475	26,775	27,730	28,400
SOUTHERN TAGALOG	16,291	18,030	19,956	22,691	24,463
BICOL	12,440	13,016	13,802	14,505	15,186
WESTERN VISAYAS	14,661	15,345	15,955	16,893	18,050
CENTRAL VISAYAS	2,687	2,925	3,141	3,500	3,913
EASTERN VISAYAS	4,876	5,592	6,267	6,850	7,471
WESTERN MINDANAO	5,732	6,145	6,662	6,993	7,340
NORTHEASTERN MINDANAO	6,347	7,276	8,482	9,753	11,280
SOUTHEASTERN MINDANAO	7,925	9,251	10,143	11,074	13,295
SOUTHERN MINDANAO	6,641	7,052	7,651	8,012	8,720

1/ The following three increments added to FY 74-75 base production figure of 113.2 million cavans. The same holds true at the regional levels using their respective FY 74-75 regional production as base figures.

2/ Production increments due to irregation under NIA's Twenty Five-Year Program.

3/ Production increments due to additional cultivation under GO-47, PD-472, Palayan ng Bayan, NGA-DEC Farming tie-up, NGA Farms and Sab-A Basin.

4/ Production increments due to increase in yield per hectare as a result of supervised farming and allied government production strategies.

PARTICULARS	1981	1982	1983	1984	1985
PHILIPPINES	186,063	197,054	206,830	215,731	224,567
Irrigation	43,614	50,639	56,694	61,914	67,009
New Cultivation	9,965	10,447	10,589	10,595	10,602
Extension Work	19,281	22,755	26,344	30,020	33,755
ILOCOS REGION	12,316	13,206	14,051	14,546	15,236
CAGAYAN VALLEY	26,548	28,277	29,966	31,334	32,142
CENTRAL LUZON	28,999	29,490	29,895	30,347	30,932
SOUTHERN TAGALOG	26,099	28,267	30,157	31,895	33,460
BICOL REGION	15,837	16,554	17,314	18,006	18,610
WESTERN VISAYAS	19,052	19,934	21,142	21,916	22,481
CENTRAL VISAYAS	4,311	4,596	4,857	5,104	5,367
EASTERN VISAYAS	8,077	8,695	9,188	9,567	9,923
WESTERN MINDANAO	7,689	8,013	8,362	8,683	9,031
NORTHEASTERN MINDANAO	12,527	13,282	13,895	15,024	16,108
SOUTHEASTERN MINDANAO	15,281	17,003	17,746	18,209	18,813
SOUTHERN MINDANAO	9,319	9,733	10,250	11,095	12,458

PARTICULARS :	1986 :	1987 :	1988 :	1989 :	1990
PHILIPPINES	229,363	232,426	237,950	242,765	247,974
Irrigation	71,804	77,172	82,723	87,538	92,747
New Cultivation	10,602	10,602	10,602	10,602	10,602
Extension Work	33,755	31,423	31,423	31,423	31,423
ILOCOS REGION	15,697	16,837	17,892	18,631	19,430
CAGAYAN VALLEY	32,503	33,556	34,665	35,802	37,255
CENTRAL LUZON	31,318	31,596	32,047	32,463	32,958
SOUTHERN TAGALOG	33,888	34,228	34,536	34,890	35,214
BICOL REGION	19,208	20,064	20,910	21,377	22,071
WESTERN VISAYAS	22,653	22,900	23,231	23,780	23,997
CENTRAL VISAYAS	5,480	5,693	5,741	5,789	5,835
EASTERN VISAYAS	10,027	10,149	10,239	10,311	10,376
WESTERN MINDANAO	9,170	9,371	9,562	9,709	9,856
NORTHEASTERN MINDANAO	16,575	14,359	14,555	14,695	14,852
SOUTHEASTERN MINDANAO	19,263	19,430	19,656	19,846	20,050
SOUTHERN MINDANAO	13,576	14,293	14,908	15,466	16,074

PARTICULARS	1991	1992	1993	1994	1995
PHILIPPINES	253,892	258,493	262,133	266,004	269,859
Irrigation	98,666	103,267	106,906	110,777	114,633
New Cultivation	10,602	10,602	10,602	10,602	10,602
Extension Work	31,423	31,423	31,423	31,423	31,423
ILOCOS REGION	20,704	21,312	22,125	22,808	23,267
CAGAYAN VALLEY	38,924	39,333	39,741	40,225	40,631
CENTRAL LUZON	33,445	34,032	34,331	34,702	35,148
SOUTHERN TAGALOG	35,514	35,835	36,112	36,399	36,714
BICOL REGION	22,792	23,661	24,216	24,827	25,475
WESTERN VISAYAS	24,260	24,830	24,994	23,231	25,472
CENTRAL VISAYAS	5,879	5,921	5,976	6,034	6,082
EASTERN VISAYAS	10,523	10,597	10,653	10,711	10,856
WESTERN MINDANAO	9,982	10,066	10,145	10,229	10,318
NORTHEASTERN MINDANAO	15,038	15,237	15,615	15,883	16,159
SOUTHEASTERN MINDANAO	20,220	20,446	20,534	20,603	20,641
SOUTHERN MINDANAO	16,605	17,218	17,685	18,335	19,090

PARTICULARS	1996	1997	1998	1999	2000
PHILIPPINES	273,559	277,140	280,194	283,087	286,204
Irrigation	118,333,	121,914	124,968	127,861	130,978
New Cultivation	10,602	10,602	10,602	10,602	10,602
Extension Work	31,423	31,423	31,423	31,423	31,423
ILOCOS REGION	23,793	24,679	24,935	25,398	25,802
CAGAYAN VALLEY	41,143	41,654	41,938	42,109	42,276
CENTRAL LUZON	35,376	36,020	36,309	36,720	37,025
SOUTHERN TAGALOG	37,030	37,164	37,477	37,765	37,984
BICOL REGION	25,787	26,153	26,767	27,117	27,512
WESTERN VISAYAS	25,691	25,909	26,043	26,147	26,281
CENTRAL VISAYAS	6,126	6,170	6,180	6,180	6,180
EASTERN VISAYAS	10,921	10,985	11,066	11,160	11,248
WESTERN MINDANAO	10,396	10,474	10,575	10,628	10,816
NORTHEASTERN MINDANAO	16,322	16,516	16,684	16,833	17,014
SOUTHEASTERN MINDANAO	20,719	20,757	20,796	20,834	20,873
SOUTHERN MINDANAO	19,872	20,653	21,419	22,191	23,179

SOURCE NGA

CORN: Estimated Production by Region
FY 1976-2000 In Thousand Bags of 50 KILO

PARTICULARS :	1976 :	1977 :	1978 :	1979 :	1980
PHILIPPINES[1/]	49,464	54,129	59,092	64,334	69,900
Increase in Yield[2/]	1,613	3,323	5,153	7,075	9,112
New Cultivation[3/]	2,791	5,747	8,880	12,200	15,728
ILOCOS	595	641	690	742	797
CAGAYAN VALLEY	5,244	5,651	6,083	6,541	7,027
CENTRAL LUZON	663	708	765	807	861
SOUTHERN TAGALOG	3,914	4,267	4,641	5,038	5,459
BICOL	1,845	2,003	2,169	2,346	2,534
WESTERN VISAYAS	2,477	2,662	2,856	3,066	3,287
CENTRAL VISAYAS	4,187	4,471	4,789	5,108	5,447
EASTERN VISAYAS	1,909	2,096	2,895	2,505	2,728
WESTERN MINDANAO	2,360	2,579	2,811	3,057	3,318
NORTHERN MINDANAO	2,523	2,680	2,846	3,022	3,209
SOUTHERN MINDANAO	8,502	9,533	10,628	11,788	13,019
CENTRAL MINDANAO	15,240	16,833	18,521	20,309	22,208

1/ The following two increaments added to FY 1974-75 base production figure of 45.06 M cavans. The same holds true at the regional levels using their respective FY 1974-75 regional production as base figure.

2/ Production increments due to increase in yield per hectare brought about by Masagana Maisan and allied government production strategies.

3/ Production increments due to additional cultivation as projected using MAAGAP Model.

PARTICULARS	1981	1982	1983	1984	1985
PHILIPPINES	72,309	74,728	77,157	79,595	82,043
Increase in Yield	11,271	13,439	15,616	17,802	19,997
New Cultivation	15,978	16,229	16,481	16,733	16,987
ILOCOS REGION	813	830	846	863	880
CAGAYAN VALLEY	7,118	7,330	7,482	7,635	7,788
CENTRAL LUZON	871	882	893	903	914
SOUTHERN TAGALOG	5,636	5,815	5,994	6,174	6,354
BICOL	2,606	2,678	2,750	2,822	2,895
WESTERN VISAYAS	3,348	3,410	3,473	3,535	3,598
CENTRAL VISAYAS	5,510	5,574	5,637	5,701	5,765
EASTERN VISAYAS	2,835	2,943	3,051	3,159	3,268
WESTERN MINDANAO	3,432	3,547	3,663	3,778	3,895
NORTHERN MINDANAO	3,228	3,247	3,266	3,285	3,304
SOUTHERN MINDANAO	13,656	14,294	14,935	15,579	16,226
CENTRAL MINDANAO	23,189	24,173	25,162	26,155	27,151

PARTICULARS :	1986 :	1987 :	1988 :	1989 :	1990
PHILIPPINES	84,499	86,965	89,440	91,926	94,421
Increase in Yield	22,200	24,412	26,633	28,863	31,101
New Cultivation	17,239	17,493	17,747	18,003	18,260
ILOCOS REGION	897	914	930	947	965
CAGAYAN VALLEY	7,942	8,097	8,252	8,408	8,564
CENTRAL LUZON	925	936	346	957	968
SOUTHERN TAGALOG	6,535	6,717	6,900	7,083	7,267
BICOL	2,968	3,041	3,115	3,189	3,263
WESTERN VISAYAS	3,660	3,723	3,787	3,850	3,914
CENTRAL VISAYAS	5,830	5,894	5,959	6,024	6,089
EASTERN VISAYAS	3,377	3,486	3,596	3,707	3,817
WESTERN MINDANAO	4,011	4,128	4,246	4,364	4,482
NORTHERN MINDANAO	3,323	3,342	3,361	3,381	3,400
SOUTHERN MINDANAO	16,874	17,525	18,179	18,835	19,494
CENTRAL MINDANAO	28,151	29,155	30,163	31,175	32,191

PARTICULARS :	1991 :	1992 :	1993 :	1994 :	1995
PHILLIPINS	96,858	99,342	101,783	104,252	106,728
Increase in Yield	33,349	35,603	37,865	40,133	42,408
New Cultivation	18,450	18,679	18,858	19,059	19,260
ILOCOS R GION	981	997	1,014	1,031	1,047
CAGAYAN VALLEY	8,715	8,887	9,018	9,171	9,328
CENTRAL LUZON	978	989	999	1,009	1,019
SOUTHERN TAGALOG	7,448	7,628	7,807	7,991	8,173
BICOL	3,335	3,408	3,480	3,553	3,626
WESTERN VISAYAS	3,965	4,037	4,098	4,160	4,222
CENTRAL VISAYAS	6,150	6,210	6,271	6,332	6,394
EASTERN VISAYAS	3,927	4,036	4,146	4,256	4,366
WESTERN MINDANAO	4,598	4,715	4,832	4,949	5,067
NORTHERN MINDANAO	3,417	3,433	3,450	3,466	3,483
SOUTHERN MINDANAO	20,145	20,797	21,451	22,108	22,766
CENTRAL MINDANAO	33,194	34,200	35,209	36,221	37,236

PARTICULARS	1996	1997	1998	1999	2000
PHILIPPINES	109,213	111,705	114,204	116,711	119,226
Increase in Yield	44,691	46,980	49,276	51,580	53,890
New Cultivation	19,462	19,665	19,868	20,072	20,276
ILOCOS REGION	1,064	1,081	1,097	1,114	1,131
CAGAYAN VALLEY	9,477	9,630	9,784	9,939	10,094
CENTRAL LUZON	1,030	1,040	1,051	1,061	1,071
SOUTHERN TAGALOG	8,356	8,540	8,724	8,909	9,094
BICOL	3,700	3,773	3,847	3,921	3,996
WESTERN VISAYAS	4,284	4,346	4,409	4,471	4,534
CENTRAL VISAYAS	6,455	6,517	6,579	6,641	6,703
EASTERN VISAYAS	4,477	4,588	4,699	4,811	4,923
WESTERN MINDANAO	5,185	5,303	5,422	5,541	5,660
NORTHERN MINDANAO	3,500	3,516	3,533	3,550	3,567
SOUTHERN MINDANAO	23,426	24,089	24,753	25,420	26,088
CENTRAL MINDANAO	38,254	39,275	40,300	41,327	42,358

SOURCE NGA

CEREALS: ANNUAL PER CAPITA RATES OF USE BY REGION, 8 SURVEYS, May-JUNE 1974-MARCH 1976, PHILIPPINES

Region		Number of families	Rice and products	Corn and products	Wheat products	Total
			Kilos per capita annually			
1.	Ilocos	611	133.8	4.0	6.8	144.6
2.	Cagayan Val.	344	115.9	18.1	10.8	144.8
3.	C. Luzon	885	134.8	1.1	7.4	143.3
4A.	Gr. Manila	792	103.0	1.5	21.7	126.2
4B.	S. Luzon	968	121.9	2.7	14.7	139.3
5.	Bicol	640	118.2	2.8	8.1	129.1
6.	W. Visayas	800	120.4	11.4	10.7	142.5
7.	C. Visayas	640	43.9	83.9	9.9	137.7
8.	E. Visayas	560	102.5	34.2	10.2	146.9
9.	W. Mindanao	246	86.4	53.0	10.7	150.1
10.	N. Mindanao	712	88.2	50.8	8.6	147.6
11.	E. Mindanao	547	78.9	52.4	10.5	141.8
12.	C. Mindanao	255	95.4	21.3	9.5	126.2
	Philippines	8,000	106.1	22.4	11.1	139.6

POINTS:

1. The annual per capital rate of use of all cereals averaged 139.6 kilos with Western Mindanao having the highest average rate and Greater Manila and Central Mindanao the lowest.
2. Rice and rice products averaged 106.o kilos and ranged from a low of 43.9 kilos in Central Visayas to a high of 134.8 kilos in Central Luzon. The major item used was rice (as rice). (See Table 2).
3. The average per capita use of corn and corn products was 22.4 kilos. It was highest in Central Visayas, 83.9 kilos, and lowest in Central Luzon, 1.1 kilos. The major item used was corn grits. (See Table 3).
4. Wheat products averaged 11.1 kilos and ranged from a low of 6.8 kilos in Ilocos to a high of 21.7 kilos in Greater Manila. The major product used was pan de sal. (See Table 4).

SOURCE: NFAC Regional Consumption Patterne for Major Foods.

RICE AND RICE PRODUCTS: ANNUAL PER CAPITA RATES OF USE BY REGION, 8 SURVEYS, MAY-JUNE 1974-MARCH 1976, PHILIPPINES

	Region	Rice	Rice noodles	Rice cakes	Total
		Kilos per capita annually			
1.	Ilocos	130.7	1.7	1.4	133.8
2.	Cagayan Val.	113.2	1.6	1.1	115.9
3.	C. Luzon	131.0	1.5	2.3	134.8
4A.	Gr. Manila	98.7	2.4	1.9	103.0
4B.	S. Luzon	117.2	2.2	2.5	121.9
5.	Bicol	115.3	1.8	1.1	118.2
6.	W. Visayas	116.4	1.6	2.4	120.4
7.	C. Visayas	41.9	1.2	0.8	43.9
8.	E. Visayas	99.5	1.5	1.5	102.5
9.	W. Mindanao	81.5	2.0	2.9	86.4
10.	N. Mindanao	85.3	1.7	1.2	88.2
11.	E. Mindanao	76.0	1.6	1.3	78.9
12.	C. Mindanao	92.5	1.5	1.4	95.4
	Philippines	102.7	1.7	1.7	106.1

CORN AND CORN PRODUCTS: ANNUAL PER CAPITA RATES OF USE BY REGION, 8 SURVEYS, MAY-JUNE 1974-MARCH 1976, PHILIPPINES

	Region	Corn grits	Whole corn	Green, sweet corn	Corn flour, meal, other	Total
		Kilos per capita annually				
1.	Ilocos	2.0	0.2	1.1	0.7	4.0
2.	Cagayan Val.	16.1	*	1.3	0.7	18.1
3.	C. Luzon	0.3	0.1	0.5	0.2	1.1
4A.	Gr. Manila	0.1	0.1	1.2	0.1	1.5
4B.	S. Luzon	0.2	0.4	1.7	0.4	2.7
5.	Bicol	1.6	0.1	1.0	0.1	2.8
6.	W. Visayas	9.4	0.8	1.1	0.1	11.4
7.	C. Visayas	81.9	0.4	1.5	0.1	83.9
8.	E. Visayas	33.7	-	0.4	0.1	34.2
9.	W. Mindanao	51.3	0.1	1.6	-	53.0
10.	N. Mindanao	50.0	0.1	0.6	0.1	50.8
11.	E. Mindanao	50.3	0.6	1.2	0.3	52.4
12.	C. Mindanao	20.1	-	1.1	0.1	21.3
	Philippines	20.9	0.2	1.1	0.2	22.4

* Less than 0.05 kilo.

SOURCE: NFAC Regional Consumption Patterne for Major Foods

INCOME-QUANTITY ELASTICITIES FOR SELECTED ITEMS BY REGION, 8 SURVEYS, MAY-JUNE 1974-MARCH 1976, PHILIPPINES

Region	Item	Rice and products	Rice	Corn and products	Corn grits	Wheat products	Pan de sal	Loaf bread
1.	Ilocos	0.02	-0.01	-0.40	-1.20	0.67	0.75	*
2.	Cagayan Val.	0.09	0.09	-1.03	-1.13	0.90	1.10	*
3.	C. Luzon	0.06	0.04	*	*	0.56	0.43	*
4A.	Gr. Manila	0.01	0.00	*	*	0.23	-0.06	0.70
4B.	S. Luzon	0.01	0.00	*	*	0.55	0.34	*
5.	Bicol	0.09	0.08	*	*	0.58	0.39	*
6.	W. Visayas	0.13	0.12	-0.51	-0.65	0.77	0.69	*
7.	C. Visayas	0.31	0.30	-0.02	-0.01	0.65	0.54	*
8.	E. Visayas	0.13	0.11	-0.31	-0.33	0.65	0.63	*
9.	W. Mindanao	0.20	0.21	-0.77	-0.79	0.55	0.49	*
10.	N. Mindanao	0.48	0.47	-0.56	-0.57	0.74	0.68	*
11.	E. Mindanao	0.45	0.44	-0.55	-0.59	0.75	0.74	*
12.	C. Mindanao	0.23	0.23	-0.80	-0.73	0.47	0.46	*
	Philippines	0.13	0.11	-0.55	-0.61	0.71	0.62	0.99

Region	Item	Pork	Beef and carabeef	All poultry meat	Live chicken	Dressed chicken	All eggs
1.	Ilocos	0.86	0.93	0.83	0.93	*	0.69
2.	Cagayan Val.	0.69	0.75	0.48	0.38	*	0.91
3.	C. Luzon	0.81	0.90	0.81	0.69	*	0.59
4A.	Gr. Manila	0.76	0.88	0.82	*	0.78	0.51
4B.	S. Luzon	1.18	1.03	0.90	0.77	*	0.71
5.	Bicol	0.80	0.74	0.83	0.74	*	0.58
6.	W. Visayas	0.79	0.69	0.72	0.66	*	0.70
7.	C. Visayas	0.55	0.96	0.79	0.68	*	0.78
8.	E. Visayas	0.64	0.63	0.83	0.82	*	0.73
9.	W. Mindanao	0.78	1.08	0.21	0.10	*	0.51
10.	N. Mindanao	0.82	0.92	0.84	0.66	*	0.97
11.	E. Mindanao	0.76	0.91	0.52	0.46	*	0.49
12.	C. Mindanao	0.48	0.70	0.42	0.37	*	0.75
	Philippines	0.82	0.90	0.80	0.57	1.13	0.77

* Not computed due to pattern and/or low level of use.

SOURCE: Regional Consumption Patterne for Major Foods. NFAC

Estimated Supply and Demand of Rice and Corn by Region in 1985

Unit: 1,000 MT

Region	Population (1000 person) 1/	Milled rice				Corn				Projected location of 11 terminal silo
		Per capita consumption KG 2/	Consumption 3/	Production 4/	Gap	Per capita consumption KG 5/	Consumption 6/	Production 7/	Gap 8/	
I. ILOCOS	3,486	133.8	515	488	Δ 27	4.0	63	44	Δ 19	
II. Cagayan Valley	2,407	115.9	279	1,029	750	18.1	92	389	297	Aparri
III. C. Luzon	5,510	134.8	740	990	250	1.1	72	46	Δ 26	Mariveles
IV. S. Tagalog	6,735	121.9	821	1,071	Δ 499	2.8	105	314	113	
M. Manila	7,027	103.0	749			1.5	96			Manila
V. BICOL	3,729	118.2	441	596	155	2.8	58	145	87	Tabaco
VI. W. Visayas	4,336	120.4	522	719	297	11.4	123	179	56	Iloilo
VII. C. Visayas	3,924	43.9	172	172	0	83.9	529	288	Δ 241	Cebu
VIII. E. Visayas	2,768	102.5	284	317	33	34.2	171	163	Δ 8	Tacloban
IX. W. Mindanao	2,935	86.4	254	290	36	53.0	263	195	Δ 68	Zamboanga
X. N.E. Mindanao	4,101	88.2	362	515	153	50.8	353	165	Δ 188	Cagayan D'Oro
XI. S.E. Mindanao	3,688	78.9	291	602	311	52.4	326	1,358	1,032	Davao, G. Santos
XII. S. Mindanao	2,827	95.4	270	399	129	21.3	121	811	690	
Total	53,834	106.1	5,712	7,186	1,474	22.4	2,372	4,097	1,725	

ANNEX 2-6 (1/2)

1/ Annex 1-5

2/ Annex 2-3, Annex 2-4

3/ (population) x (per capita consumption)

4/ Converted into milled rice. Recovery rate: 64% Annex 2-1

5/ Corngrits and others for direct use as food.

6/ Converted into corngrits: this figure is an aggregate of corngrits for direct consumption and for direct animal feed by farmers. Therefore, those for formula feed, starch and glucose are executed. Calculated from the following formula:

$$\left(\frac{\text{Per-capita consumption by region}}{\text{Milling recovery of corngrits (0.68)}} + \frac{\text{Total production (4,097)} \times \text{Ratio for direct animal feed by farmers (0.15)}}{\text{Population of the Philippines (53,834)}}\right) \times \text{(Population by region)}$$

7/ Corngrain Annex 2-2

8/ Note: In the Philippines, on an average 60% are for corngrits, 12-15% for direct use as animal feed by farmers, 10-12% for formula feed used at feed mill, and 6-8% are for starch and glucose.

Existing Ricemills, by Kind/Ownership
by Region/Province, CY 1974-75

REGION/PROVINCE		PRIVATELY OWNED				NGA OWNED		TOTAL	
		KISKISAN		CONO		CONO		Unit	Cap.*
		Unit	Cap.*	Unit	Cap.*	Unit	Cap.*		
	PHILIPPINES	10,216	370,272	2,762	375,420	44	11,420	13,022	757,112
I.	ILOCOS REGION	2,180	54,228	344	29,121	3	288	2,527	83,637
II.	CAGAYAN VALLEY	854	31,211	242	17,349	5	588	1,101	49,238
III.	CENTRAL LUZON	968	51,651	813	168,424	7	840	1,788	220,915
IV.	SOUTHERN TAGALOG	1,191	45,117	319	45,663	5	488	1,515	91,268
V.	BICOL REGION	712	27,017	216	17,502	7	1,020	935	45,539
VI.	WESTERN VISAYAS	1,614	55,256	164	20,304	1	120	1,779	75,680
VII.	CENTRAL VISAYAS	287	10,928	102	6,551	1	120	390	17,599
VIII.	EASTERN VISAYAS	596	21,269	71	5,338	3	360	670	26,967
IX.	WESTERN MINDANAO	243	8,328	125	11,954	2	240	370	20,522
X.	MORTHEASTERN MINDANAO	636	21,650	131	12,630	1	120	768	34,400
XI.	SOUTHEASTERN MINDANAO	605	25,292	35	9,972	2	240	642	35,504
XII.	SOUTHERN MINDANAO	269	14,998	55	14,961	1	120	325	30,079
XIII.	METRO-MANILA	61	3,327	145	15,561	6	6,876	212	25,764

* Palay input in cavans of 50 kilos per 12 hours operation.

OBTAINED FROM : NGA

RICEMILL: Apparent Capacity Requirement 1/
By Region/Province, CY1974-75

	REGION/PROVINCE	Available Grain for Milling 2/	Existing Capacity 3/	Apparent Add'nl Ricemill Capacity Requirement 4/	Apparent Excess Ricemill Capacity
	PHILIPPINES	106,834,962	757,112	65,962	440,375
I.	ILOCOS REGION	7,635,867	83,637	1,267	55,980
II.	CAGAYAN VALLEY	13,284,845	49,238	8,361	9,635
III.	CENTRAL LUZON	19,311,457	220,915	-	147,766
IV.	SOUTHERN TAGALOG	12,237,494	91,268	1,679	46,593
V.	BICOL REGION	12,024,995	45,549	14,701	14,690
VI.	WESTERN VISAYAS	12,360,111	75,680	7,749	36,611
VII.	CENTRAL VISAYAS	2,099,622	17,599	711	10,356
VIII.	EASTERN VISAYAS	3,888,308	26,967	1,563	13,802
IX.	WESTERN MINDANAO	4,174,359	20,522	-	4,710
X.	NORTHEASTERN MINDANAO	5,275,137	34,400	6,471	20,511
XI.	SOUTHEASTERN MINDANAO	6,672,902	35,504	17,246	47,455
XII.	SOUTHERN MINDANAO	5,739,030	30,079	6,099	14,439
XIII.	METRO-MANILA	2,125,835	25,764	115	17,827

* 1/ Based on the assumption that whatever is produced in a province is milled in that province.
2/ Annual provincial produce minus field losses and seeding requirements.
3/ Palay input in cavans per 12 hours.
4/ Existing milling capacity subtracted from the quantity in cloumn 1 divided by 264 days, assumed utilization of ricemills in a year. In cavans of 50 kilos per 12 hours operation.

* OBTAINED FROM : NGA

STANDARD GRADE REQUIREMENTS FOR PHILIPPINE MILLED RICE

	Premium Grade %	Grade 1 %	2 %	3 %
1. Head Rice	95 Min.	85.0 Min.	75.0 Min.	65.0 Min.
2. Brokens	4 Max.	12.0 Max.	20.0 Max.	28.0 Max.
3. Binlid (Passes through Sieve 4/64)	1 "	3.0 "	5.0 "	7.0 "
4. Yellow & damaged	0.5 "	1.0 "	2.0 "	4.0 "
5. Chalky & Inmature kernels	2.0 "	4.0 "	6.0 "	8.0 "
6. Paddy (No./100 grams)	None	1.0 "	2.0 "	3.0 "
7. Other varieties	2 Max.	4.0 "	6.0 "	8.0 "
8. Red Rice	None	0.50 "	1.0 "	1.5 "
9. Foreign Matter	None	0.25 "	0.5 "	1.0 "

STANDARD GRADE REQUIREMENTS FOR ROUGH RICE

G R A D E	1	2	3	4	5
Purity (Min. %)	98	96	94	92	90
Foreign Matter (Max. %)	2	4	6	7.75	9.5
Weed and Other Crop Seed (Max. %)	None	None	Trace	0.25	0.5
Cracked Kernels (Max. %)	3	4	5	6	7
Immature Kernels (Max. %)	None	2	4	7	10
Damaged Kernels (Max. %)	2	3	4	6	8
Other Variety (Max. %)	3	5	8	12	17
Fermented Kernels (Max. %)	None	0.5	1	2	3
Red Rice (Max. %)	Trace	1	2	3	4
Moisture Content (Max. %)	14	14	14	14	15

Pauay + F.M. + Seeds = 100%

STANDARD GRADE REQUIREMENTS FOR SHELLED CORN

Grade %	Broken kernels and Foreign Matter %	Damaged kernels		Moisture Content %
		Total Damaged %	Heat Damaged %	
1	2	4	0.3	14
2	3	5	0.5	14
3	5	6	1.0	15
4	7	8	2.2	16
5	10	10	3.0	16

STANDARD GRADE REQUIREMENTS FOR CORN GRITS

Grade	Moisture Content % (Max.)	Fermented & Damaged Grits % (Max.)	Foreign Matter % (Max.)	Grits of Other Color % (Max.)	Grits of Other sizes % (Max.)
Premium	14.0	Trace	Trace	Trace	1.0
1	14.0	0.5	0.5	0.5	4.0
2	14.0	1.0	0.75	1.5	7.0
3	14.0	2.0	1.0	3.0	10.0
4	14.0	3.0	2.0	5.0	13.0

CLASSIFICATION OF THE SIZE FOR CORN GRITS

4.3.1 Corn grits No.8 - grits should not pass mesh sieve Nos. 10, 12, 14 and 16.

4.3.2 Corn grits No. 10 - grits should not pass mesh sieve Nos. 12, 14 and 16.

4.3.3 Corn grits No. 12 - grits should not pass mesh sieve Nos. 14 and 16.

4.3.4 Corn grits No. 14 - grits should not pass mesh sieve No. 16.

4.3.5 Corn grits No. 16 - grits pass sieve No. 16.

SIZES OF MESH SIEVE

No. 8 - 2.362 mm - 2.884 mm (0.093 inch - 0.114 inch)

No. 10 - 1.651 mm - 2.257 mm(0.065 inch - 0.089 inch)

No. 12 - 1.397 mm - 1.896 mm(0.055 inch - 0.075 inch)

No. 14 - 1.168 mm - 1.614 mm(0.046 inch - 0.064 inch)

No. 16 - 0.991 mm - 1.412 mm(0.039 inch - 0.056 inch)

PERCENTAGE RICE/CORN-EATING POPULATION, BY REGION 1973

PROVINCE/REGION	CORN-EATING POP'N.	%	RICE-EATING POP'N.	%	TOTAL
PHILIPPINES	7,947,618	20.0	31,780,382	80.0	39,728,000
MANILA & SUBURBS	211,391	5.0	4,687,609	95.0	4,799,000
ILOCOS REGION	72,358	5.0	1,354,642	95.0	1,427,000
CAGAYAN VALLEY	60,447	22.0	1,261,025	78.0	1,613,000
CENTRAL LUZON	60,447	1.0	5,531,553	99.0	5,592,000
SOUTHERN TAGALOG	335,313	7.0	4,386,688	92.0	4,722,000
B I C O L	688,995	22.0	2,442,005	78.0	3,131,000
WESTERN VISAYAS	613,235	16.0	3,196,765	84.0	3,810,000
CENTRAL VISAYAS	330,900	71.0	917,000	28.0	3,226,000
EASTERN VISAYAS	73,500	30.0	1,717,000	70.0	2,452,000
WESTERN MINDANAO	517,217	25.0	1,542,783	75.0	2,060,000
NORTHERN MINDANAO	143,005	5.0	2,132,995	94.0	2,276,000
SOUTHERN MINDANAO	909,683	26.0	2,610,317	74.0	3,520,000

1/ - Based on the 1958 BCS Survey

SOURCE : GRAIN JOURNAL, NGA - AUGUST, 1976

TOTAL FEED MILL CAPACITY OF THE PHILIPPINES, BY REGIONAL LOCATION OF MILL (in 000's of 50-kg. bags), 1975.[1/]

	TOTAL PRODUCTION CAPACITY (in 000's 50-kg. bags)			REGIONAL CAPACITY SHARES (% of totals)		
	All Mills	PAFMI	Non-PAFMI	All Mills	PAFMI	Non-PAFMI
TOTAL PHILIPPINES[2/]	16,620.1	7,457.3	9,162.8	100.0%	45.0%	55.0%
TOTAL LUZON[2/]	14,623.1	6,958.1	7,665.0	88.0%	41.9%	46.1%
Region I. METROPOLITAN MANILA	7,814.4	4,642.5	3,171.9	47.0	27.9	19.1
Region II. ILOCOS	124.8	-	124.8	0.8	0.0	0.8
Region III. CAGAYAN VALLEY	-	-	-	0.0	0.0	0.0
Region IV. CENTRAL LUZON[2/]	5,086.6	2,315.6	2,771.0	30.6	13.9	16.7
Region V. SOUTHERN LUZON	1,335.3	-	1,335.3	8.0	3.0%	8.0
Region VI. BICOL	262.0	-	262.0	1.6	0.0	1.6
TOTAL VISAYAS	721.0	499.2	221.8	4.3%	3.0%	1.3%
Region VII. WESTERN VISAYAS	3.1	-	3.1	0.0	0.0	0.0
Region VIII. EASTERN VISAYAS	717.9	499.2	218.7	4.3	3.0	1.3
TOTAL MINDANAO	1,276.0	-	1,276.0	7.7%	0.0%	7.7%
Region IX. NORTHERN MINDANAO	751.9	-	751.9	4.5	0.0	4.5
Region X. SOUTHERN MINDANAO	524.1	-	524.1	3.2	0.0	3.2

NOTES: 1/ Based on 8-hour/26-day month labor year.

2/ Includes Superior Feed Mill which temporarily suspended operations in June, 1975.

SOURCES: CENTER FOR RESEARCH AND COMMUNICATION for PAFMI-member figures; and BUREAU OF ANIMAL INDUSTRY, Animal Feed Control Division for non-PAFMI-member figures.

FEED MILLING CAPACITIES OF PAFMI MEMBERS

NAME OF MILLERS	FEED MILLING CAPACITY (PER MONTH)	SHARE OF IMPORTED Y.CORN	MATERIAL BEING COMPOUN
SMA (MANILA)	ABT 10,000 MT	37 %	Y. CORN ABT 5,000 MT SOYBEAN MEAL 3,000 FISH MEAL 1,500 MEAT BONE MEAL 1,000
VITARICH (C.LUZON)	ABT 7,000 MT	23 %	Y. CORN ABT 3,000 MT SB. MEAL 2,500 FISH MEAL 500 MEATBONE MEAL 500
URC (MANILA)	ABT 5,000 MT	15%	Y. CORN ABT 2,500 MT SB. MEAL 1,500 FISH MEAL 500 MEATBONE MEAL 500
GFM (CEBU/MANILA)	ABT 5,000 MT	11 %	Y. CORN ABT 3,000 MT SB. MEAL 1,500 FISH MEAL 300 MEATBONE MEAL 200
RFM (MANILA)	ABT 2,000 MT	8 %	Y. CORN ABT 1,000 MT & VARIOUS
PFM (MANILA)	ABT 2,000 MT	1 %	Y. CORN ABT 1,000 MT & VARIOUS
CFM (MANILA)	ABT 2,000 MT	1 %	Y. CORN ABT 1,000 MT & VARIOUS
LFM (MANILA)	U. A.	1 %	VARIOUS
FEA (MANILA)	U. A.	1 %	VARIOUS
SFM (C. LUZON)	U. A.	1 %	VARIOUS
MFM (C. LUZON)	U. A.	1 %	VARIOUS

ABBREVIATION:

SMF	SANMIGUEL FEED MILLS
VITARICH	VITARICH CORP
URC	UNIVERSAL ROBINA CORP
GFM	GENERAL FEED MILLS
RFM	REPUBLIC FLOUR MILLS
PFM	PHILIPPINE FEED MILLING CO
CFM	CHAMPION FEED MILLS
LFM	LIBERTY T-LOUR MILLS
FEA	FAR EAST AGRICULTURAL & SUPPLY
SFM	SUPERIOR FEED MILLS
MFM	MABUHAI FEED MILLS
U.A.	UNAVAILABLE

TEAM'S ESTIMATION BASED ON THE OFFICIAL INFORMATION

CORN (SHELLED) Production, BY VARIETY AND BY REGION, 1973

(Sack of 57 Kilograms)

Region	White	Yellow	Others[1/]	Total	
Philippines	28,140,700 (1,604,000) Ton	3,080,500 (175,600) Ton	903,900 (51,500) Ton	32,125,100 (1,831,130) Ton	100%
Ilocos	137,900	173,300	175,900	487,100	1.5%
Cagayan Valley	3,617,800	97,300	80,100	5,795,200	12.0%
Central Luzon	250,200	251,000	63,600	564,800	1.8%
Southern Tagalog	1,388,400	1,282,000	144,000	3,314,400	10.3%
Bicol	1,157,300	119,100	117,000	1,393,400	4.3%
Eastern Visayas	1,368,300	2,300	8,500	1,379,100	4.3%
Central Visayas	2,935,900	80,800	46,000	3,062,700	9.4%
Western Visayas	864,000	526,600	105,600	1,496,200	4.7%
N & E Mindanao	2,575,700	9,700	13,500	2,598,900	8.0%
S & W Mindanao	13,845,200	38,400	149,700	14,033,300	43.7%

1/ Sweet Corn, Glutinous Corn, Pop Corn.

OBTAINED FROM NGA

MONTHLY TOTAL RICE STOCK POSITION, PHILIPPINES 1975

(In Thousand Sacks of 50 kilos)

	Farm	Non-Farm	Urban	GMA	Total	(BAEcon) Commercial Warehouse	NGA Local	NGA Imported	NGA Total	GRAND TOTAL
JANUARY	9,269	3,060	2,278	194	14,801	2,099	650	1,970	2,620	19,520
FEBRUARY	7,153	1,880	2,720	168	11,921	2,122	758	1,720	2,478	16,521
MARCH	7,429	2,440	2,703	163	12,735	1,779	777	1,415	2,192	16,706
APRIL	8,847	1,820	3,060	163	13,530	2,106	790	991	1,781	17,417
M A Y	8,947	2,820	2,890	163	14,820	2,443	968	1,210	2,178	19,441
JUNE	6,739	2,140	5,185	77	14,141	2,468	1,067	1,378	2,445	19,054
JULY	7,590	2,040	3,026	170	12,826	2,096	1,334	2,974	4,308	19,230
AUGUST	4,531	1,600	2,023	150	8,304	1,773	1,302	2,707	4,009	14,086
SEPTEMBER	3,634	960	2,040	168	66,802	1,722	1,051	2,337	3,388	11,912
OCTOBER	3,887	1,060	2,754	163	7,864	2,232	958	1,362	2,320	12,416
NOVEMBER	6,578	1,300	3,502	189	11,569	2,070	1,020	968	1,988	15,627
DECEMBER	6,601	1,840	4,029	179	12,649	1,829	1,428	822	2,250	16,728
(Total)	(81,205)									(198,658)

SOURCE: BAEcon & NGA

MONTHLY TOTAL CORN STOCK POSITION, PHILIPPINES 1975

(In Thousand Sacks of 50 kilos)

	Farm	Non-Farm	Urban	GMA	Total	(BAEcon) Commercial Warehouse	NGA Local	NGA Imported	NGA Total	GRAND TOTAL
JANUARY	3,956	1,460	1,156	-	6,572	797	42	278	320	7,689
FEBRUARY	1,679	720	612	-	3,011	498	35	157	192	3,701
MARCH	1,081	420	102	-	1,603	372	44	68	112	2,087
APRIL	2,070	640	782	-	3,492	635	26	165	191	4,318
M A Y	1,587	660	289	-	2,536	256	41	174	215	3,007
JUNE	2,093	1,000	357	-	3,450	637	67	225	292	4,379
JULY	2,116	720	340	-	3,176	1,326	73	899	972	5,474
AUGUST	1,863	840	374	-	3,077	814	117	260	377	4,268
SEPTEMBER	2,646	760	850	-	4,255	1,618	234	299	533	6,406
OCTOBER	2,944	1,080	1,122	-	5,146	1,640	474	185	659	7,445
NOVEMBER	3,013	1,300	867	-	5,180	1,976	651	214	865	8,021
DECEMBER	2,068	788	972	-	3,828	456	829	177	1,006	5,290
(Total)	(27,115)									(62,085)

SOURCE: BAEcon & NGA

PALAY EQUIVALENT NET WEIGHT FACTORS

This adjusted table shall supersede the Table of Equivalent Net Weight Factor-Exhibit A covered by SOP DM-001 Series of 1974 in the Direct Palay Procurement.

% Purity	Moisture Content												
	14%	14.1 to 15%	15.1 to 16.0%	16.1 to 17.0%	17.1 to 18.0%	18.1 to 19.0%	19.1 to 20.0%	20.1 to 21.0%	21.1 to 22.0%	22.1 to 23.0%	23.1 to 24.0%	24.1 to 25.0%	25.1 to 26%
A) 95% to 100%	100	0.99	0.98	0.95	0.94	0.92	0.90	0.88	0.87	0.86	0.84	0.82	0.81
B) 90% to 94.9%	0.97	0.96	0.95	0.92	0.91	0.88	0.87	0.86	0.84	0.82	0.81	0.80	0.78
C) 85% to 89.9%	0.92	0.91	0.90	0.87	0.86	0.84	0.82	0.80	0.79	0.78	0.76	0.74	0.73
D) 80% to 84.9%	0.87	0.86	0.85	0.82	0.81	0.78	0.77	0.76	0.74	0.72	0.71	0.70	0.68

Revised Instruction in determining Peso Value of the Palay.

1. Determine the gross weight (GW) of the palay.
2. Determine the net weight (NW) of the palay by subracting the weight of container from the Gross Weight.
3. Determine % moisture content and the % purity of the palay.
4. Based on the % moisture content and % purity, determine the equivalent net weight factor (ENWF).
5. Multiply the equivalent net weight factor to the net weight of the palay to get the equivalent net weight (ENW) or the Basic Weight (BW).
6. Peso Value = Equivalent Net Weight of Palay X Buying Price.

Source: NGA

CORNGRAINS EQUIVALENT NET WEIGHT FACTORS

% Purity	Moisture Content 14%	14.1-15%	15.1-16%	16.1-17%	17.1-18%	18.1-19%	19.1-20%
A) 97% to 100%	1.00	0.99	0.98	0.95	0.94	0.915	0.90
B) 94% to 96.9%	0.98	0.97	0.96	0.93	0.92	0.895	0.88
C) 91% to 93.9%	0.95	0.94	0.93	0.90	0.89	0.865	0.85
D) 88% to 90.0%	0.92	0.91	0.90	0.87	0.86	0.835	0.82

INSTRUCTIONS FOR THE USE OF TABLE:

1. Determine the % Moisture Content and % purity of the purchased corngarains.

2. Based on the Moisture Content and the purity of the corngrains, determine the weight factor on the above table.

3. Determine the gross weight of the corn. Then, subtract the weight of sack from the gross weight to get the net weight.

4. Multiply the net weight to the weight factor to get the Equivalent Net Weight (ENW).

5. Cost = Equivalent Net Weight x Buying Price.
   Equivalent Net Weight (Basic Weight) refers to weight exclusive of shrinkage allowance and weight of sacks, i.e., weight expected at 14% moisture content and 95% purity.

Source: NGA

REGISTERED WHOLESALERS AND RETAILERS OF CORN
(AS OF DECEMBER 15, 1974)

REGION	RETAINERS			WHOLESALERS		
REGION	CORN	RICE/CORN	TOTAL	CORN	RICE/CORN	TOTAL
PHILIPPINES	677	2,367	3,044	376	761	1,137
MANILA & SUBURBS	346	559	905	272	164	436
ILOCOS REGION	11	25	36	2	15	17
CAGAYAN VALLEY	11	141	152	3	102	105
CENTRAL LUZON	36	190	226	7	89	96
SOUTHERN TAGALOG	36	125	161	3	19	22
BICOL	46	133	179	2	11	13
WESTERN VISAYAS	107	98	205	9	50	59
CENTRAL VISAYAS	12	318	340	47	144	191
EASTERN VISAYAS	8	373	381	7	54	61
WESTERN MINDANAO	16	146	162	11	27	38
NORTHERN MINDANAO	30	138	168	9	25	34
SOUTHERN MINDANAO	8	121	129	4	61	65

Source: Directorate for Grains Business Regulations,
NATIONAL GRAINS AUTHORITY

WHEAT PRODUCTS: ANNUAL PER CAPITA RATES OF USE BY REGION, 8 SURVEYS, MAY-JUNE 1974-MARCH 1976, PHILIPPINES

Region	Pan de sal	Loaf bread	Cookies, crackers	Noodles, other	Total
		Kilos per capita annually			
1. Ilocos	4.3	0.6	0.8	1.1	6.8
2. Cagayan Val.	5.5	1.0	1.4	2.9	10.8
3. C. Luzon	4.8	0.4	0.8	1.4	7.4
4A. Gr. Manila	12.9	3.1	1.4	4.3	21.7
4B. S. Luzon	9.7	1.0	1.1	2.9	14.7
5. Bicol	5.3	0.6	0.7	1.5	8.1
6. W. Visayas	4.7	1.1	1.2	3.7	10.7
7. C. Visayas	5.1	0.8	0.9	3.1	9.9
8. E. Visayas	5.6	1.1	1.2	2.3	10.2
9. W. Mindanao	4.9	1.3	1.4	3.1	10.7
10. N. Mindanao	4.1	0.9	1.2	2.4	8.6
11. E. Mindanao	5.3	1.2	1.3	2.7	10.5
12. C. Mindanao	5.2	0.9	0.9	2.5	9.5
Philippines	6.3	1.1	1.1	2.6	11.1

Source: NFAC, Regional Consumption Pattern for Major Food P.4.

NGA SUPPORT PRICES FOR PALAY, CORN AND CEILING PRICES FOR RICE, CORN GRITS

(Price/kilo)

1972 - 1976

PALAY and RICE

Effective Date	Support Price	Index	Ceiling Price	Index
September 1972	₱0.54	100	₱1.10	100
April 1973	0.70	129.6	1.25	113.6
January 1974	0.80	148.1	1.70	154.6
November 1974	1.00	185.2	1.90	172.7
May 1976	1.10	203.7	2.10	190.9

CORN and CORN GRITS

Effective Date	Support Price	Index	Ceiling Price	Index
November 1972	₱0.40	100	₱ -	-
February 1973	0.50	125	-	-
February 1974	0.62	155	-	-
October 1974	0.80	200	1.45	-
May 1976	0.90	225	1.60	-

Source: NGA

NGA Selling Price to Retailers for White and Yellow Corngrits

1973 - 1976

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1973				0.85/kl	0.85/kl		0.90/kl	0.85/kl	0.95/kl			
1974		1.20/kl				1.35/kl		1.30/kl	1.20/kl			
1975	1.35/kl						1.25/kl			1.20/kl		1.15/kl
1976		1.30/kl			1.45/kl							

SOURCE : NGA

List of NGA & Privately-Owned Warehouses by Region/Province

(As of August 31, 1976)

REGION/PROVINCE	NGA WAREHOUSE				PRIVATE		TOTAL	
	LEASED		OWNED					
	Unit	Capacity	Unit	Capacity	Unit	Capacity	Unit	Capacity
PHILIPPINES	322	8,726,895	63	3,483,182	3,481	25,985,282	3,866	38,195,359
I. ILOCOS REGION	19	523,400	3	120,800	144	850,766	166	1,484,966
II. CAGAYAN VALLEY	8	97,600	7	295,320	334	2,022,418	349	2,415,338
III. CENTRAL LUZON	20	961,400	16	1,163,500	982	8,634,789	1,018	10,759,689
IV. SOUTHERN TAGALOG	32	477,400	6	179,700	236	1,740,631	274	2,397,731
V. BICOL REGION	29	362,600	4	188,600	234	1,252,449	267	1,803,649
VI. WESTERN VISAYAS	42	534,700	5	359,000	139	1,695,214	186	2,588,914
VII. CENTRAL VISAYAS	20	905,400	2	56,000	117	1,342,948	139	2,304,348
VIII. EASTERN VISAYAS	25	225,500	3	92,400	113	376,480	141	694,380
IX. WESTERN MINDANAO	29	913,975	3	174,000	77	921,173	109	2,009,148
X. NORTHEASTERN MINDANAO	36	705,600	1	44,000	203	714,938	240	1,464,538
XI. SOUTHEASTERN MINDANAO	18	472,340	7	516,950	155	2,854,076	180	3,843,366
XII. SOUTHERN MINDANAO	22	706,060	3	145,500	497	2,135,659	522	2,987,219
XIII. METRO-MANILA	22	1,840,920	3	147,412	250	1,443,741	275	3,432,073

SOURCE: NGA

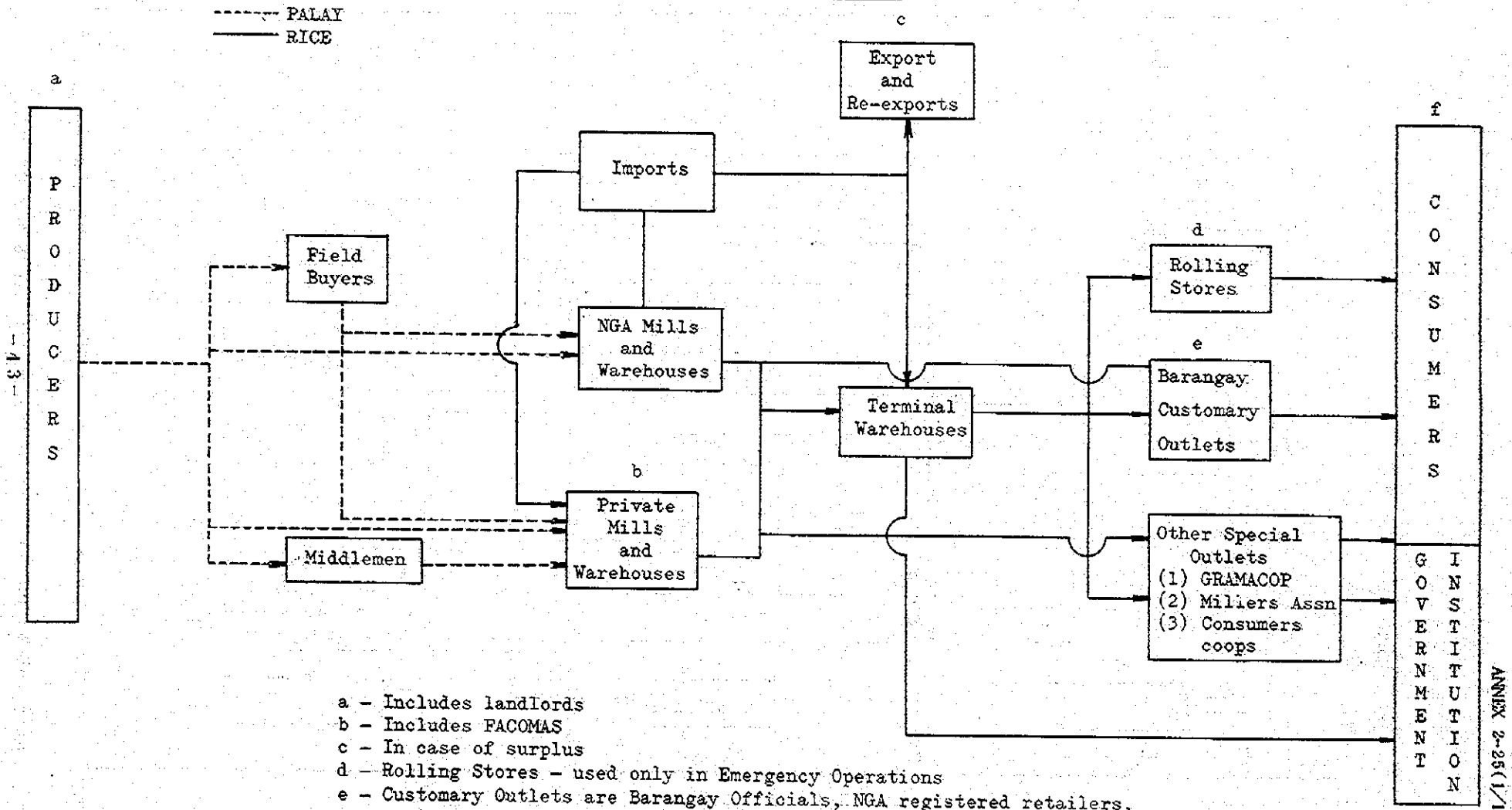
Retailers and Wholesalers Engaged/8 in the Grains Business

	Retailers Wholesalers	Retailers	Wholesalers	Total	% to Total
Philippines	4,931	27,811	3,122	35,564	100%
Luzon					
Manila & Suburbs	391	3,242	63	3,696	
Ilocos Region	511	2,144	113	2,768	
Cagayan Valley	331	617	195	1,145	
Central Luzon	764	1,603	224	2,591	
Southern Tagalog	658	4,432	298	4,388	
Bicol	444	3,183	163	3,790	
TOTAL - LUZON	3,099	15,223	1,056	18,378	52%
VISAYAS					
Western Visayas	206	1,853	523	2,582	
Central Visayas	77	3,506	241	3,824	
Eastern Visayas	77	1,853	523	2,582	
TOTAL - VISAYAS	319	7,555	990	8,864	25%
MINDANAO					
Western Mindanao	92	989	417	1,498	
Northern Mindanao	340	2,193	791	3,324	
Southern Mindanao	781	1,851	868	3,500	
TOTAL - MINDANAO	1,213	5,033	1,076	8,322	23%

8/ The NGA Program for 1973-74, National Grains Authority

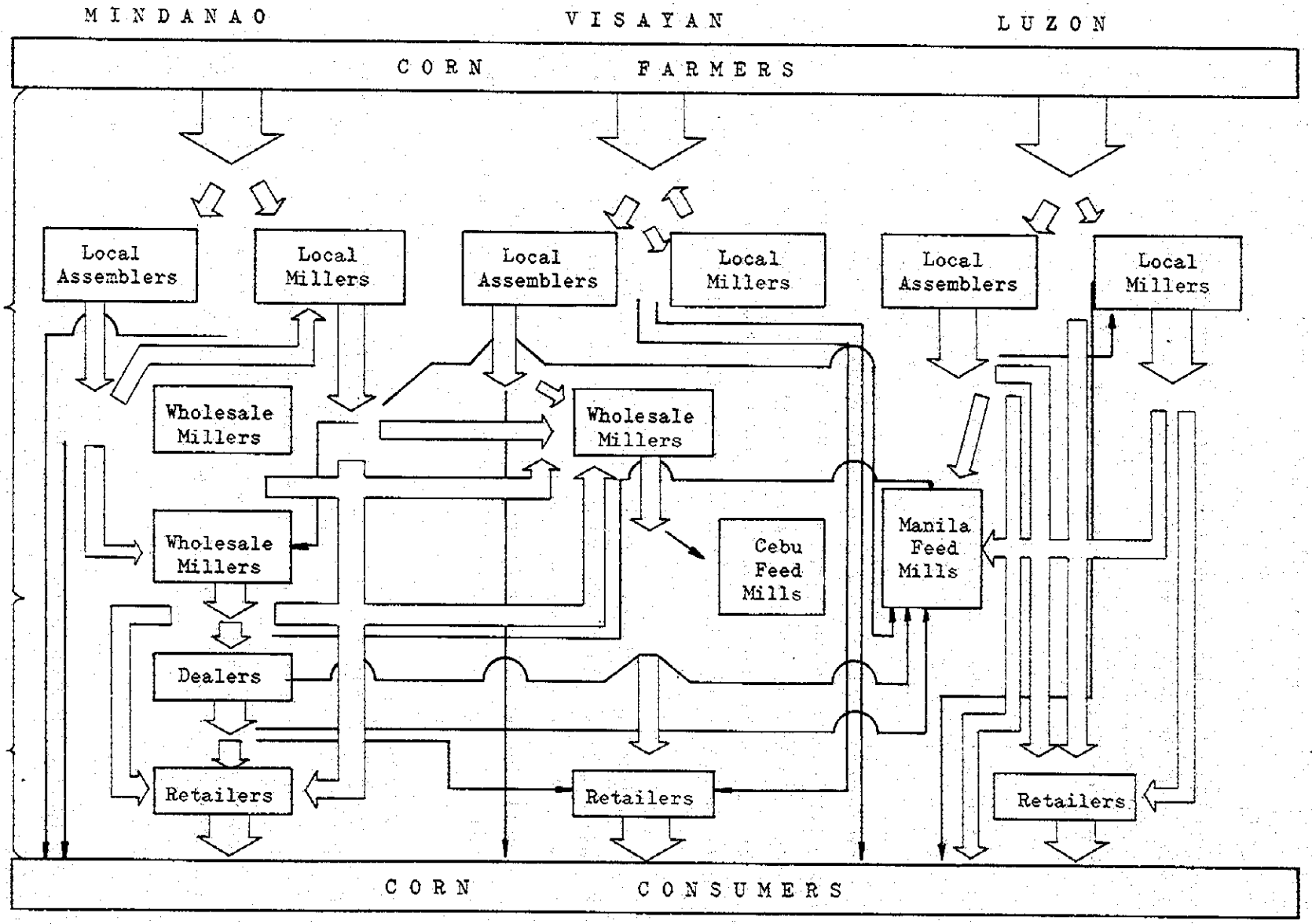
Source: NGA

PALAY/RICE MARKETING CHANNEL



a - Includes landlords
b - Includes FACOMAS
c - In case of surplus
d - Rolling Stores - used only in Emergency Operations
e - Customary Outlets are Barangay Officials, NGA registered retailers, municipal treasury and appointed retailers, also utilized in times of shortage
f - Includes religious organizations, hotels and restaurant

REGIONAL CORN MARKETING CHANNEL



SOURCE: Philippines Council for Agricultural Research

OBTAINED BY: NGA

Storage of Milled Rice in Silos

Annual palay production in the Philippines amount to approximately 6.5 million tons. Rice is used as staple food by 80% of the population, so that annual per capita consumption of rice (milled rice) is about 110 kg. Storage of rice in the grain terminal silo is discussed below.

1. Storage, milling and distribution of rice

Because of the high temperature climate throughout the year in the Philippines, rice is usually stored in unhulled state for a long period to preserve its quality.

Rice is milled at the place of production to save transportation costs. Husk, the main by-product in the milling process, is practically worthless even as animal feed. Transportation of rice in unhulled state would mean costly transportation as well as an inefficient one, since unhulled rice is bulky. (Apparent specific gravity of unhulled rice is 0.60 against 0.85 of milled rice.)

Therefore, rice is usually stored in warehouses at the place of production in unhulled state for a long period. After being milled, it is promptly brought to the place of consumption to be stored in warehouses. From the warehouses in the consuming area, which serve as a distribution center, rice is transported to retailers within a short period.

Therefore, if rice is to be stored in the proposed terminal silos in Manila and Cebu, it will be stored in milled state.

2. Technical problems in handling rice at the grain terminal silo

Unlike the handling of rice in small-size silos such as country elevators, handling of rice at large-scale silos at parts presents the following problems.

(i) Breakage

Rice grown in the South East Asia is long-shaped and brittle and

is easily crushed. Milled rice now being distributed in the Philippines has a high percentage of broken rice.

Rice containing large quantities of broken rice inevitably decreases in price. A large-scale terminal silo contains many devices which would cause rice to be crushed, such as high-efficiency pneumatic unloader, high-impact air-flow transportation system, and bucket elevators and silo bins with a large fall.

(ii) Separation of crushed and uncrushed rice

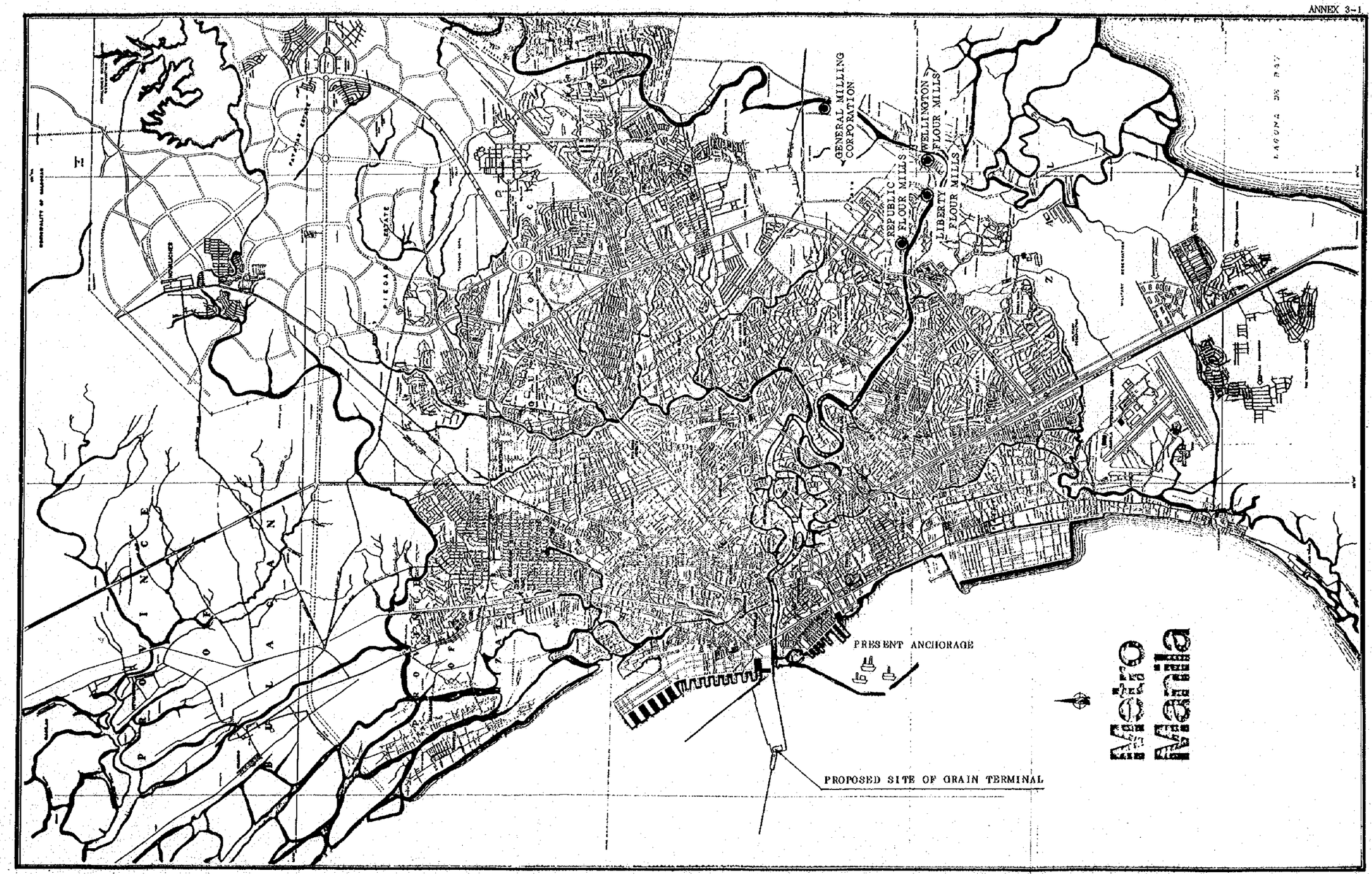
When rice containing large quantities of crushed rice is discharged from a large-size silo, crushed and uncrushed are separated within the silo in the process of discharge.

Technically it is possible to solve the problems of rice crush and separation during discharge. However, the improvement will inevitably result in lower efficiency in operation as well as higher equipment cost. Facilities which are considerably different from those for wheat and corn, which can withstand greater impact, will be called for in the construction of rice silos.

III GRAIN TERMINAL PROJECT IN MANILA

IV SPECIFICATIONS OF THE GRAIN TERMINAL FACILITIES IN MANILA

V FINANCIAL AND ECONOMIC ANALYSES OF THE GRAIN TERMINAL IN MANILA


GENERAL MILLING CORPORATION
WELLINGTON FLOUR MILLS
REPUBLIC FLOUR MILLS
LIBERTY FLOUR MILLS
LAGUNA DE BAY
PRESENT ANCHORAGE
PROPOSED SITE OF GRAIN TERMINAL
Manila Bay

Capacity of Silo Bins for Storing Wheat (Manila)

a) Wheat consumption per capita in Metro Manila is assumed to be the figure derived by dividing the total wheat import of 247,291 tons at the Port of Manila in 1975 by the population of 4,929,813 in Metro Manila.

b) With this per capita consumption fixed as a constant, should it be increased in accordance with an advance of eating habits, an estimated import of each year is worked out by multiplying thereby pertinent population projected for Metro Manila by NEDA as shown below:

	Population in Metro Manila	What Import Project (Manila) (in thousand tons)
1975	4,929,813	247
76	5,129,181	257
77	5,338,806	268
78	5,559,249	279
79	5,791,112	290
80	6,035,034	303
81	6,212,316	312
82	6,406,147	321
83	6,604,999	331
84	6,813,261	342
85	7,026,936	352
86	(7,224,393)	361
87	(7,427,398)	372
88	(7,636,108)	382
89	(7,850,683)	393
90	8,071,620	405
91	(8,231,438)	413
92	(8,394,420)	421
93	(8,560,630)	430
94	(8,730,130)	438
95	8,905,468	447

	Population in Metro Manila	What Import Project (Manila) (in thousand tons)
1996	(9,070,219)	455
97	(9,238,018)	464
98	(9,408,921)	472
99	(9,582,986)	481
2000	9,757,340	489
1	(9,937,851)	498
2	10,121,700	507
3	10,308,951	517
4	10,499,666	526
5	10,693,909	536
6	10,891,746	546
7	11,093,243	556
8	11,298,467	566

Note: As NEDA projected the figures only for the years of 1990, 1995 and 2000 after 1985, the figures between these years are calculated based on annual average growth rate between any pertinent two years and those after 2000 are estimated dependent upon the annual average growth rates between 1995 and 2000.

c) Projected import is 370 thousand tons in 1987, 30 thousand tons of which, about one month's import, would be stored as buffer stock.

d) Privately-owned silos have the following capacities:

	Total capacity (in ton)	For Wheat out of the Total Capacity (in ton)
REPUBLIC FLOUR MILL	33,000	31,000
WELLINGTON FLOUR MILL	12,000	12,000
LIBERTY FLOUR MILL	12,500	12,000
UNIVERSAL ROBINA CO.	26,600	24,000
Total	84,100	79,000

Capacity of Silo Bins for the Operation of Handling Wheat (Manila)

a) With a 300 tons/H pneumatic unloader working daytime and unloading efficiency of 80 percent, a daily unloading capacity is as follows:

300 tons/H x 0.8 x 8 H = 1,920 tons

b) In spite of the same capacity of 300 tons/H to load onto barges, an actual loading capacity is assumed to be 1,540 tons, which is twenty percent less than the above capacity of 1,920 tons, due to time loss through barge operation.

c) The minimum holding capacity for handling operation is presumed to be 3,600 tons that is calculated by multiplying 380 tons being a difference of unloading capacity and loading capacity by 9.4 days which are extracted from the current average unloading volume of 18 thousand tons per vessel at the Port of Manila divided by the above unloading capacity of 1,920 tons.

d) Moreover, taking into consideration such a time of unable upstreaming on the Pasig River, it is desirous for an efficient and effective operation of silo to equip itself with sufficient capacity enough to take hold of, at least, 6,000 tons, one third of current average unloading volume of 18 thousand tons per vessel, or 5,760 tons which are equivalent to three days' volume of daily unloading capacity of 1,920 tons.

e) In view of the foregoing, the capacity of silo bins for handling operation is set at 6,000 tons.

Capacity of Silo Bins for Storing Feed Grain (Manila)

a) Demand for feed grain in Manila district in 1975 is estimated according to the NGA data on the following basis:

Total corn production in the Philippines in 1975 is 2,568 thousand tons (NGA data), out of which 308 thousand tons are assumed to be feed corn.
The delivery to feed millers is estimated to be 81 thousand tons, which amounts to 60 percent of the farmers' sales which, in turn, constitutes 44 percent of the whole feed corn production, and 76 percent of the delivery is deemed to be allocated to Manila district. As a result 62 thousand tons are consumed as home produced feedstuff, while 92 thousand tons of feed grain are imported in 1975 for the demand in Manila district, which has a total demand for feed grain of 154 thousand tons.

b) According to the other NGA data, the total formula feed production by feed millers in Manila district amount to 491 thousand tons, of which material corn constitutes 25.4 percent based on the hearing from feed millers. Thus, an annual demand for feed grain is 125 thousand tons.
The same data substantiate an assumption of annual feed grain of 96 thousand tons demanded by minor feed millers other than those major makers upon the Pasig River.

c) Taking into consideration the foregoing paragraphs of a) and b), 96 thousand tons of feed grain are quite reasonable as demands by those minor feedstuff makers.

d) Assuming a growth rate of 4 percent per annum for those minor feed millers, which is less than 5 percent projected by NGA as an annual growth rate of formula feed in future, the future demand is estimated for the minor feed millers as follows:

Annual Demand
(in thousand tons)

1975	96	1987	154	1999	254
76	100	88	160	2000	265
77	104	89	172	1	276
78	108	90	179	2	287
79	112	91	186	3	298
80	116	92	193	4	310
81	121	93	202	5	322
82	126	94	209	6	335
83	131	95	217	7	349
84	137	96	227	8	363
85	142	97	225		
86	148	98	245		

e) It is supposed to attain self-sufficiency of feed grains at the latest in 1980 and, thus, no import is assumed after 1980.

f) As the projected demand of 154 thousand tons in 1987 will be mainly supplied from the district of Southern Tagalog close to Manila, there is no need to store such a large stock so that silo capacity of 5,000 tons is enough there, which is equivalent to about ten days stock.

g) It is presumed that all the demand by minor feed millers should pass through this grain terminal.

Capacity of Pneumatic Unloader of the Grain Terminal in Manila

a) It is presumed, for the purpose of deciding the capacity of a pneumatic unloader, that an average volume of incoming good handling is being kept all year around in spite of unbalanced arrival of cargo to the port of Manila due to the trends of international grain market, NGA budgets, swelling of Pasig River and other reasons or seasonal fluctuation of demand.

b) Projection is made with unloaders whose capacity varies from 200 tons/H to 600 tons/H (operational efficiency of 80 percent) and working time of 8 hours and 24 hours to see the number of working days:

Unloader Capacity (tons/H)	Working Time (H)	Practical Unloading Capacity (tons)	Year and Annual Handling Volume				
			1975 343,000 tons	1987 526,000 tons	1990 584,000 tons	200 754,000 tons	2008 929,000 tons
			days	days	days	days	days
200	8	1,280	268	411	456	589	726
	24	3,840	89	137	152	196	242
300	8	1,920	179	274	304	393	484
	24	5,760	60	91	101	131	161
400	8	2,560	134	205	228	295	363
	24	7,680	45	68	76	98	121
500	8	3,200	107	164	183	236	290
	24	9,600	36	55	61	79	97
600	8	3,840	89	137	152	196	242
	24	11,520	30	46	51	65	81

Annual handling volume means the total of wheat import and feed grain both import and domestic purchase.

c) Based on our experience, the optimum number of annual working day for unloading is considered to be 140.

d) According to the above table, a 600 tons/H unloader will adequately enable handling at a volume of 526 thousand tons which is estimated for 1987 and even 929 thousand tons which is projected for the year 2008 if it can be operated in night time as well. Therefore, it is decided to provide the 600 tons/H unloader.

e) It would, however, be excessive to have it equipped with the 600 tons/H unloader in early stage. Therefore, one unit of 300 tons/H unloader alone will be installed for the time being and, eventually, increase the capacity up to 600 tons/H by installing another 300 tons/H unloader toward the end of 1986 as the second phase program.

Loading Facilities of the Grain Terminal in Manila

a) The barge loading facilities of the terminal silo fulfilling their function to load barges simultaneously with unloading from vessels are empowered with the same capacity as the unloader afore-mentioned. Thus, one unit of 300 tons/H loader is to be installed for the first phase of this project and, subsequently, another 300 tons/H loader will be added toward the end of 1986 as incorporated in the second phase of the project.

b) The quantities of barge loading are set to be 90 percent of the total unloaded wheat, the balance of which, being 10 percent, is reserved in the event of unnavigability on the Pasig River, at which time trucks are to undertake the transportation. The estimated quantities of loading to the barge and to trucks respectively are as follows:

(in thousand tons)

Year	Loading to barge	Loading to truck	Year	Loading to barge	Loading to truck
1975	222	25	1989	354	39
76	231	26	90	364	41
77	241	27	91	372	41
78	251	28	92	379	42
79	261	29	93	387	43
80	273	30	94	394	44
81	281	31	95	402	45
82	289	32	96	409	46
83	298	33	97	418	46
84	308	34	98	425	47
85	317	35	99	433	48
86	325	36	2000	440	49
87	335	37	1	448	50
88	344	38	2	456	51
89	354	39	3	465	52

Year	Loading to barge	Loading to truck	Year	Loading to barge	Loading to truck
2004	473	53	2007	500	56
5	482	54	8	509	57
6	491	55			

c) The practical efficiency of a 300 tons/H barge loading equipment is set for 80 percent and again 20 percent of the efficiency is receded due to time loss caused by barge operation, the net quantity of day-time barge loading is estimated as follows:

$$300 \text{ tons} \times 0.8 \times 0.8 \times 8 \text{ H} = 1{,}536 \text{ tons}$$

The number of annual working days based on the above quantity 178 days in 1980 and 211 days in 1986 dependent upon one unit of 300 tons/H equipment and 109 days in 1987 and 166 days in 2008 dependent upon two units of the same, all of which are adequately practicable.

d) Except by barges, transportation of import wheat to flour mills is assumed by trucks because of no railway facility available thereto. The number of loadings per day onto 15 ton trucks are calculated to be 8.2 in 1987 and 12.6 in 2008 (on the basis that 25 working days a month during the relevant years).

e) The facilities of bulk loading from the silo onto trucks are managed by three lines of 100 tons/H conveyors, totalling 300 tons/H capacity. These conveyors to carry out goods in the silo are to provide services both for barge loading and truck loading, which means that the service for the latter cannot be provided during the barge loading. However, when the unloaded grain is going directly to barge loading without going through silo bin, truck loading can be made because above mentioned conveyors are not used for barge loading. At the end of 1986, additional facilities of another 300 tons/H capacity will be completed.

f) Taking into account that there is at the moment few feed millers which are equipped with appropriate facilities to receive bulk

delivery and that, even with future improvement, there will still exist millers who are only able to handle feed grain in bag, a demand for grain in bag is expected to remain on the level of 36 thousand tons each year and, thus, is to require an installation of bagging facilities with a capacity of 20 tons per hour.

g) Delivery of feed grain is expected as follows:

(in thousand tons)

Year	Delivery in bag	Delivery in bulk	Year	Delivery in bag	Delivery in bulk
1975	36	60	1992	36	157
76	36	64	93	36	166
77	36	68	94	36	173
78	36	72	95	36	181
79	36	76	96	36	191
80	36	80	97	36	199
81	36	85	98	36	209
82	36	90	99	36	218
83	36	95	2000	36	229
84	36	101	1	36	240
85	36	106	2	36	251
86	36	112	3	36	262
87	36	118	4	36	274
88	36	124	5	36	286
89	36	136	6	36	299
90	36	143	7	36	313
91	36	150	8	36	327

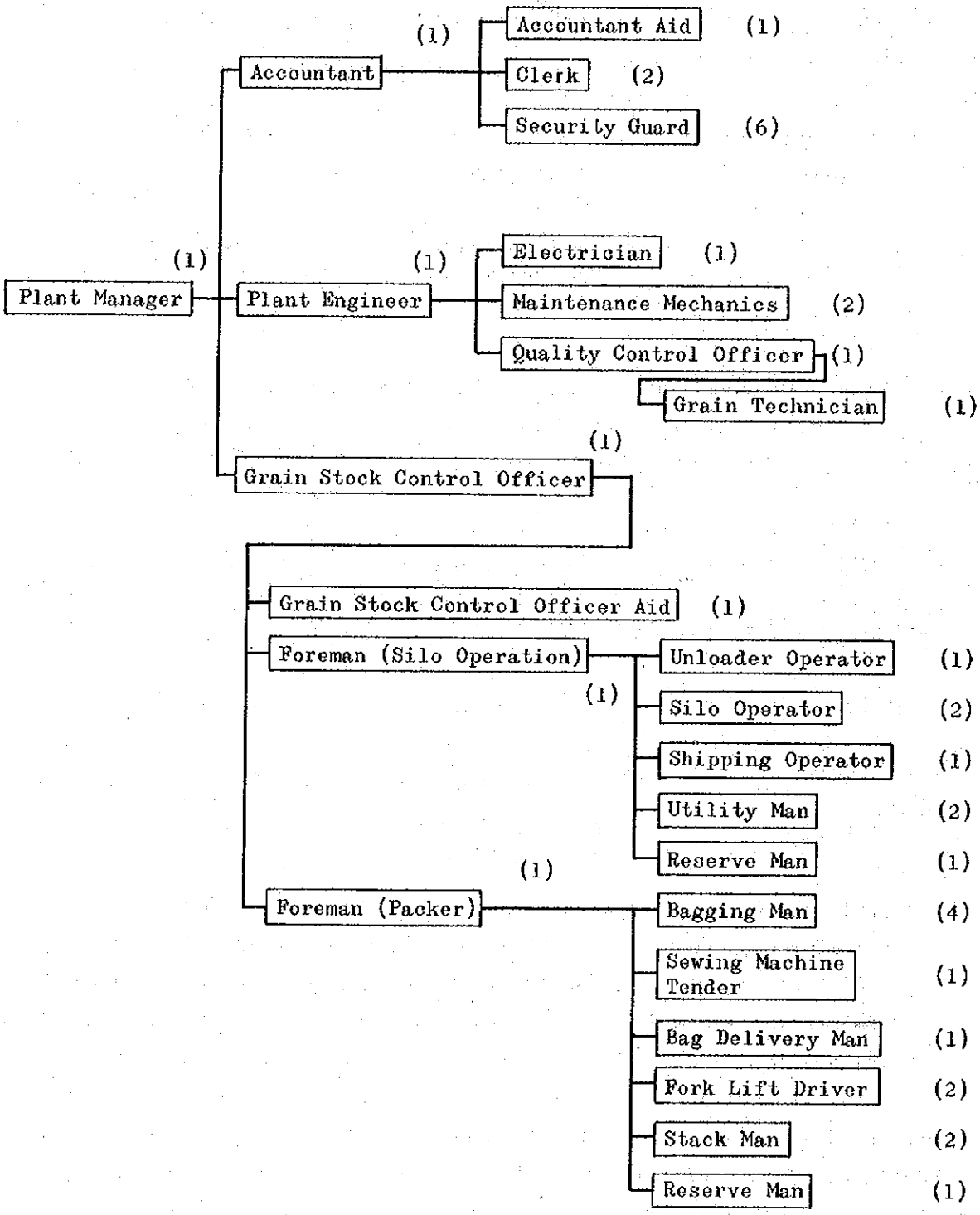
h) The transportation of feed grain to feed millers will depend on trucks because there are no railraod sidings to feed milelrs now. However, with a view to the future possibility of installation of railway facilities to the feed millers, layout of the grain terminal is designed so that it can meet railway delivery as well.

i) The number of loadings of feed grain onto 15 ton trucks is calculated to be 34.2 per day in 1987 and 80.7 in 2008, which will amount to 42.4 in 1987 and 93.3 in 2008 by adding that which is required for wheat as described in the above paragraph (d), namely 8.2 in 1987 and 12.6 in 2008.

j) As for delivery of grain in bag, smooth operation of delivery can be ensured with current stock of three days' production of bagged grain because of convenience of goods handling in general. For this purpose, a one-story warehouse is to be built with a capacity of storing 360 tons.

ANNEX 3-7 (1/1)

MANILA GRAIN TERMINAL ORGANIZATION CHART



Revenues of the Grain Terminal in Manila

1. Basis for the estimate of handling charges

The current tariff is as follows:

Lighterage	Basic rate of barge	P1.5/day ton
	Tug-boat rate	P4,000/day
	Lighterage (Upstreaming the Pasig from the Port of Manila)	P15/ton
Stevedorage		P14.95/ton

Based on the above tariff, the transportation charge to carry wheat on board to Universal Robina Co. on the Pasig is as follows:

Lighterage	
Basic rate: P1.5/day ton x 1,500 tons x 3 days	= P 6,750
Tug-boat rate: P4,000 x 3 days	= P12,000
Lighterage: P15 x 1,500 tons	= P22,500
Sub-total	P41,250
Stevedorage: P14.95 x 1,500 tons	= P22,425
Total	P63,675
Unit charge per ton P63,675 ÷ 1,500 tons	P42.45

The actual contract, however, has been made at the rate of P29.79 per ton including all of the above-mentioned items between Universal Robina Co. and a barge operator (Lusteve Co.) since April 1, 1975, which means that a lump contract can achieve such a special discount as to reduce the charge down to the level of 29.79/42.95 of the full rate. The handling charge at the terminal is set out lest it should become relatively expensive in comparison with the current cargo handling charges and the reduction achieved by construction of the terminal is the equivalent of one day's stevedoring and basic lighterage (saved because of increased loading capacity onto barges) and also a day's

tug-boat rate, namely:

Stevedorage	₱14.95 x 29.75/42.45 (tariff)	=	₱10.49/ton
Basic rate of barge			₱ 1.5/ton
Tug-boat rate	₱4,000 ÷ 1,500 tons	=	₱ 2.67/ton
Total			₱14.66/ton

Therefore, a new transportation charge for users is provided at the rate of ₱15.30/ton (₱29.96 - ₱14.66).
Service charge at the grain terminal has been set at the rate of 15 pesos per ton as NGA wants to keep the users' burden on the same level as that which is currently available.

2. Basis for estimate of bagging expenditure

The bagging expenditure covers the personnel expenses and labour cost of those who are engaged in the bagging works. The cost of bagging materials is excluded from the estimate of revenues and expenditure of the terminal as it is designed to be at the users' expense. The personnel expenses and labour cost of bagging and outward handling will be ₱60,861 (₱1.66/ton) per annum for the annual turnover of 36 thousand tons as shown in Annex 3-9.

3. Import fee

The import fee has set to be ₱21.88/MT to be appropriated to the operational expenditure of the grain terminal and it will be equivalent to 1.30 percent of the proposed sales price ₱1,705/LT from NGA to flour mills.

Expenditures of the Grain Terminal in Manila

1. Personnel expenditures and labour cost (Unit price is provided by NGA):

(1) Office

	Number of Personnel	In Peso/year
Plant manager	1	30,267
Plant engineer	1	19,161
Accountant	1	13,315
Grain stock control officer	1	11,570
Quality control officer	1	9,264
Accountant-aid	1	5,264
Clerk	2	10,079
Security guard	6	30,236
Office total	14	129,156

(2) Work shop

Grain technician	1	8,478
Electrician	1	5,039
Maintenance mechanics	2	10,078
Grain stock control officer-aid	1	5,039
Work shop total	5	28,634

(3) Silo

Foreman	1	6,039
Unloader operator	1	5,039
Silo operator	2	10,078
Shipping operator	1	5,039
Utility man	2	8,864
Reserve man	1	4,432
Silo total	8	39,491

Bagging	Number of Personnel	In Peso/year
Foreman	1	6,039
Bagging man	4	20,156
Sewing Machine tender	1	5,039
Bag delivery man	1	5,039
Forklift driver	2	10,078
Stack man	2	10,078
Reserve man	1	4,432
Bagging total	12	60,861
Grand total	39	258,142

After 1987 an expansion of the terminal capacity will be accompanied by the following increase of three workers:

Unloader operator	1	5,039
Shipping operator	1	5,039
Reserve man	1	4,432
Total	3	14,510

2. Maintenance and replacement cost

The maintenance and replacement cost here means those charges for office and factory supplies, of machinery and equipment and repair of building.

The maintenance and replacement cost of machinery and equipment are empirically expressed in percentage in relation to the whole amount of the construction costs for every five years as shown in the following table because of their sizable repair and replacement to be required, and also indicated in the actual amount in the subsequent annual tabulation sheet. The other maintenance and replacement costs are assumed to total to the amount of P41,327, with an average percentage of 2.7% (empirically) to the aggregate cost of construction.

$$\frac{\text{(Sizable lot, Phase I)}}{\underbrace{67{,}757 \times 28}_{\text{(Construction cost)}\times\text{(Years)}\ \text{Phase I}}} + \frac{\text{(Sizable lot, Phase II)}}{\underbrace{35{,}151 \times 21}_{\text{(Construction cost)}\times\text{(Years)}\ \text{Phase II}}} + \frac{\text{(Others)}}{41{,}327} \fallingdotseq \frac{2.7}{100}$$

$$\frac{19{,}014}{67{,}757 \times 28} + \frac{10{,}842}{35{,}151 \times 21} + \frac{41{,}327}{} \fallingdotseq \frac{2.7}{100}$$

The other maintenance and replacement costs for those miscellaneous machinery and equipment are allocated each year over the whole period on an empirical basis as reasonably as shown in the following table:

The percentage rate of the maintenance and replacement cost of machinery and equipments are enlisted in the following tabulation

	Construction Cost (₱1,000) Note 1	Years from Commencement of Service and Application					Remarks
		5	10	15	20	25	
Pneumatic unloader	7,688 (7,688)	-	7.5%	15%	7.5%	50%	
Chain conveyor	3,661 (3,243)	-	15%	15%	100%	-	
Bucket elevator	1,570 (1,570)	-	20%	20%	100%	-	
Appex-separator	144 (144)	-	10%	10%	10%	10%	
Hopper scale	323	-	10%	10%	10%	100%	
Distributor	109 (109)	-	15%	15%	15%	15%	
Belt conveyor, machine	55 (-)	-	20%	20%	20%	20%	
Fan, bug-filter	304 (304)	-	10%	10%	10%	100%	
Compressor	35 (35)	-	10%	20%	10%	100%	
Forklift	198 (-)	80%	80%	80%	80%	80%	Trade-in value 20%
Hoist	111 (-)	-	10%	10%	10%	10%	
Miscellaneous machinery & equipment	3,117 (2,449)	10%	10%	50%	50%	10%	
Total	17,315 (15,835)						
Grand total Note 2	33,150						

Note 1. The figures in brackets show the cost of the Step II Construction.

2. The grand total means the aggregate amount of the totals of the Step I and the Step II Construction.

Estimate of Maintenance and Replacement Cost

(in ₱1,000)

Calendar Year	Year in a row	Phase I		Phase II		Others	Total
		Year in a row	Cost in large scale	Year in a row	Cost in large scale		
1978	1						
79	2						
80	3	1	0			759	759
81	4	2	0			812	812
82	5	3	0			867	867
83	6	4	0			921	921
84	7	5	468			975	1443
85	8	6	0			1029	1029
86	9	7	0			1083	1083
87	10	8	0	1	0	1093	1093
88	11	9	0	2	0	1181	1181
89	12	10	2025	3	0	1270	3295
90	13	11	0	4	0	1358	1358
91	14	12	0	5	0	1447	1447
92	15	13	0	6	0	1535	1535
93	16	14	0	7	0	1623	1623
94	17	15	3854	8	0	1712	5566
95	18	16	0	9	0	1746	1746
96	19	17	0	10	1783	1780	3563
97	20	18	0	11	0	1815	1815
98	21	19	0	12	0	1819	1819
99	22	20	7642	13	0	1821	9463
2000	23	21	0	14	0	1824	1824
1	24	22	0	15	2363	1828	4191
2	25	23	0	16	0	1831	1831
3	26	24	0	17	0	1834	1834
4	27	25	5025	18	0	1836	6861
5	28	26	0	19	0	1840	1840
6	29	27	0	20	6696	1843	8539
7	30	28	0			1845	1845
			19014		10842	41327	71183

Total Out-Flow by Local, Foreign Currency

(in ₱1,000)

Total cost other than construction	Construction cost	Local C.	Maintenance and replacement cost	Construction cost	Foreign C.
	Local C.	Total	Foreign C.	Foreign C.	Total
118	12990	13108	0	7792	7792
226	30807	31003	0	16168	16168
2295		2295	76		76
2351		2351	81		81
2389		2389	87		87
2440		2440	92		92
2610		2610	471		471
2548	3957	6505	103	4595	4698
2601	12809	15410	108	13790	13898
3004		3004	144		144
3074		3074	153		153
3659		3659	1781		1781
3248		3248	170		170
3323		3323	178		178
3396		3396	187		187
3474		3474	195		195
4582		4582	3217		3217
3616		3616	207		207
4090		4090	1636		1636
3692		3692	213		213
3691		3691	213		213
5600		5600	6327		6327
3770		3770	213		213
4363		4363	2103		2103
3797		3797	213		213
3798		3798	213		213
5055		5055	4233		4233
3855		3855	213		213
5528		5528	5574		5574
3932		3932	213		213
100125	60563	160688	28614	42345	70959

3. Electricity cost

Electricity cost consists of the demand rate (P151/kW year) and energy rate (P0.24/kW h). Assuming the demand contract to be as follows:

Phase I (1980-1986): 652 kW
Phase II (1987-2007): 1,184 kW

The demand charge is estimated to be charged at:

Phase I : P151/kW year x 652 kW = P98 thousand/year
Phase II : P151/kW year x 1,184 kW = P179 thousand/year

The energy charge, which is deemed to proportionate more or less to be the handling volume, is estimated as hereunder:

Phase I : P0.716/MT
Phase II : P0.635/MT

Annual electricity cost is shown in the Annex 5-1 (2/3).

4. Insurance premium

Insurance premium on grain is at the expense of consignors.

Insrance premium on the plant and machinery is assumed one percent of the current price thereof, which is calculated on the following basis:

(a) All the maintenance and replacement cost spent are to be added on the cost of the plant and machinery.

(b) An equal amount of the cost is depreciated each year on the basis of the following estimated life assets;

Building: 50 years
Machinery and equipment: 20 years

Annual depreciation amount is accordingly the total of one fiftieth and one twentieth of the construction costs of respective building and machinery, the actual details thereof to be listed in the table on the next page.

Estimate of Insurance Premium

(in ₱1,000)

Calendar year	Year in a row	Construction cost	Residual value at the beginning of each year	Maintenance and replacement cost	Depreciation	Insurance premium
1978	1	20782	0	0	0	0
9	2	46975	0	0	0	0
80	3		67757	759	2218	678
81	4		67298	812	2218	673
82	5		64892	867	2218	649
83	6		63541	921	2218	635
84	7		62244	1443	2218	622
85	8	8552	61469	1029	2218	615
86	9	26599	60280	1083	2218	603
87	10		94296	1093	3572	943
88	11		91817	1181	3572	918
89	12		89426	3295	3572	894
90	13		89149	1358	3572	891
91	14		86935	1447	3572	869
92	15		84810	1535	3572	848
93	16		82773	1623	3572	828
94	17		80824	5566	3572	808
95	18		82818	1746	3572	828
96	19		80992	3563	3572	810
97	20		80983	1815	3572	810
98	21		79226	1819	3572	792
99	22		77473	9463	3572	775
2000	23		83364	1824	3572	834
1	24		81616	4191	3572	816
2	25		82235	1837	3572	822
3	26		80494	1834	3572	805
4	27		78756	6861	3572	788
5	28		82045	1840	3572	820
6	29		80313	8539	3572	803
7	30		85280	1845	3572	853
		102908	2203106	71183	90538	22030

Note:-

Maintenance and replacement cost: Explained in the preceding paragraph.

Depreciation:

Example in the Term I work

Building	32,045
Machinery	23,628 (electricity included)
Others	12,084

Other items to be allocated as follows:-

Building	39,000
Machinery	28,757

Accordingly annual depreciation cost is:-

$$\frac{39,000}{50} + \frac{28,757}{20} = 2,218$$

Residual value at the beginning of each year

A residual value at the beginning of a year plus maintenance and replacement cost minus depreciation is to be a residual value of a succeeding year.

Insurance premium- (A residual value at the beginning of each year) x 0.01

5. Land rent

The land rent is estimated based on the following assumption:

1) A rent of P4/m^2 year is applied as an existing sample seen in the district of the mouth of the Batan River.

2) The land space rented is proposed to be 28,000 m^2 (yet to be confirmed).

6. Miscellaneous expenses

The miscellaneous expenses are estimated to be equivalent to 5 percent of the overall operational expenses based on the empirical study on the existing operation of silo in Japan.

7. Hatch work cost

The hatch work cost is estimated to be P20/day man provided that 12 workers are engaged a day. In view of daily unloading tonnage (net) of 1,920 tons, the unit charge is to be P0.125/ton. Hatch work cost is calculated by multiplying this unit cost by an annual handling volume of wheat and feed grain.

8. Others

As for the fumigation charge, guarantine fumigation which is not required at present shall not be carried out. According to the hearings, flour millers scarcely fumigate grains. Even if the fumigation is required, the charge shall be borne by users or at the expense of the wheat account of NGA, but not debited to the account of the terminal.

Subsoil Investigation and Evaluation at the Proposed Site in Manila

1) State of geology of the proposed site

The proposed site lies on the reclaimed land at the tip of the International Port which projects 1.5 kilometers toward the sea along the River Pasig from the North Harbor Pier-2, east of Manila City, and in the southern part of Luzon Island.

The state of Luzon Island consists of the Recent Alluvium which extends in a narrow strip from Manila Bay north-northwest to Lingayen Gulf and which is bordered on the east and west by the Alluvium Tertiary as far as the mountainous region.

Though the geological survey was not carried out because the proposed site had not been decided at that time, the geological state is conjectured from the data of penetration test at the adjacent area. The foundation plan was designed according to the geological stratum of TBH 28 and TBH 29 which are nearest the sight.

According to the data of penetration test in this site, we conclude that the soil at about 5 meters below the ground surface consists of filled-up ground by dredging and of loose clayey to silty gravelly sand including decayed plant matter carried by the River Pasig. The N values of the soil is 2 to 4.

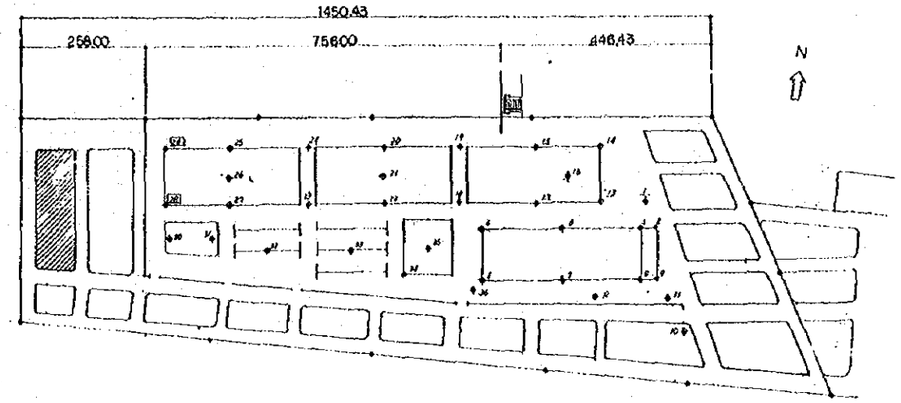
From 5 meters to around 15 meters, there is very soft silty clay with N values of 1 to 4. And between 15 meters and down to 25 meters, a part of the formation is somewhat hard sandy silt, but the other part is very dense sand and gravel formation with N values of over 200.

2) Consideration for the foundation

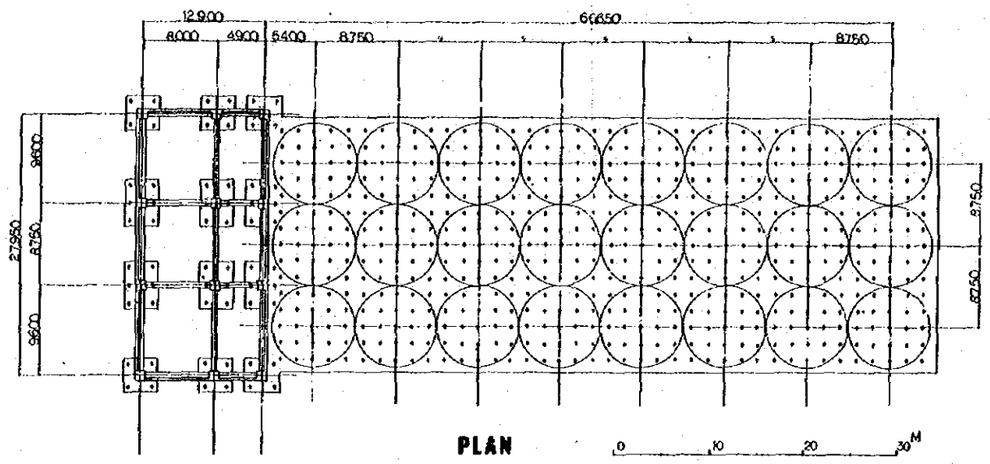
The structure to be built on the proposed site is a large-sized grain silo which will be made of reinforced concrete construction.

Judging from the geological construction of the site, the design of the pile foundation supported by the ground of the condensed silty clay and sandy clay of the diluvial and the tertiary foundation is considered appropriate for the building in this size.

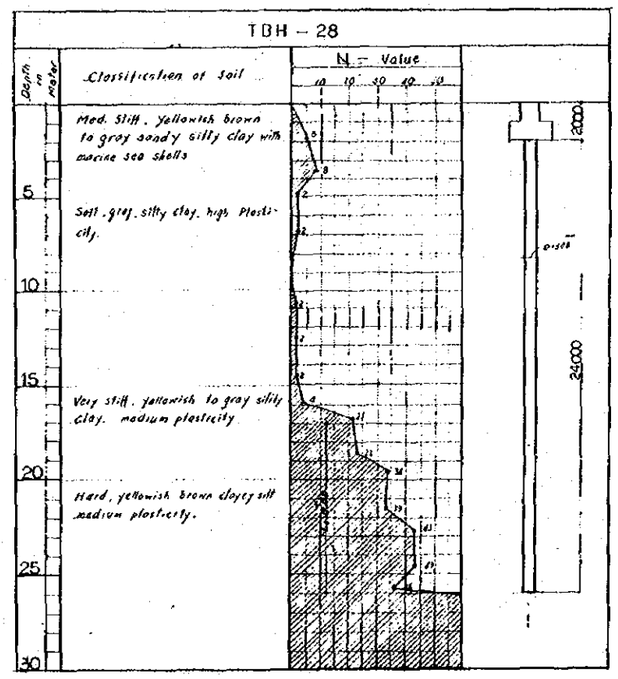
Assuming the depth of the steel pile to be about 26 meters in consideration of suitability and security, the allowable bearing capacity of the piles is calculated on drawing No. SGM-B-001.

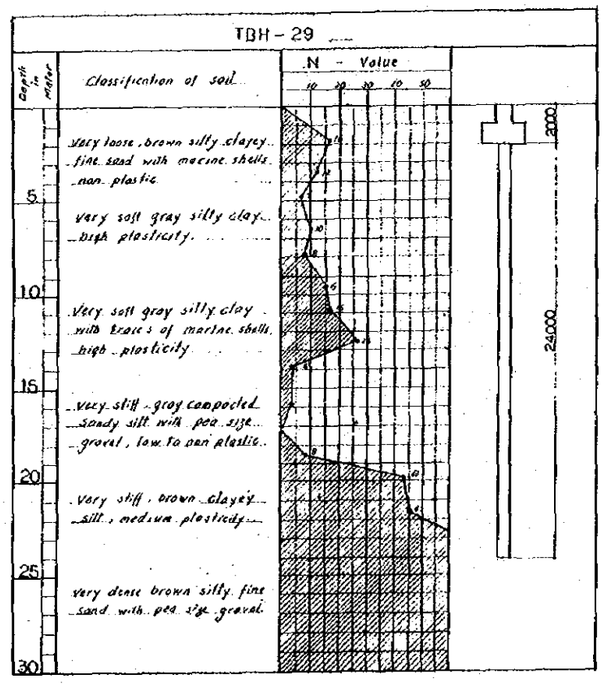


LOCATION



PLAN





Ultimate Bearing power of Pile

Meyerhof's Formula

$$Ru = 30\bar{N}Ap + \frac{\bar{q}u}{2}Ls + \frac{\bar{q}u}{2}(\ell - Ls)\Psi$$

Ru — Ultimate bearing powers of pile.

$$\bar{N} = \frac{60 + 36 + 42}{3} = 46.3$$

$$Ap = 0.506 \times 0.795 = 0.2015 \text{ m}^2$$

$$\bar{N}s = \frac{27 + 23 + 27 + 23 + 23 + 23 + 36 + 60}{8} = 36.62$$

$$Ls = 2.0 \text{ m}$$

$$\Psi = .508 \times 3.14 = 1.595$$

$\bar{q}o$, Lc — Neglect

$$Ru = 30 \times 46.3 \times 0.2015 + \frac{36.62}{2} \times 2.0 \times 1.595 = 281.17 + 105.13 = 386.6$$

Allowable Bearing power of pile $Ra = 1/3\ Ru$

$$= 1/3 \times 386.6 = 128.8 > 120^t \quad OK$$

Notation

- Ra — Allowable bearing capacity of pile
- Ru — Ultimate bearing capacity of pile
- Ap — Sectional area of pile head
- ℓ — Perimeter of pile
- $\bar{N}s$ — The average of exact measurement of N-Value into sandy formation
- Ls — Length of pile in sandy formation
  Length of pile in clayey formation
- $\bar{q}u$ — In part of penetrated pile under ground : The average of unconfined compression strength in clayey formation

GRAIN TERMINAL CONSTRUCTION PROJECT PHILIPPINES

CHECKED BY	DESIGNED BY	DRAWN BY	TITLE OF DRAWING
			MANILA EXPLANATORY DIAGRAM OF SOIL EXPLORATION
DATE: 7 Mar. 1977			
DRAWING NO.: SGM-B-001			

JAPAN INTERNATIONAL COOPERATION AGENCY

Facilities of
MANILA Grain Terminal

No.	Item	Specification	Quant.	Note
	Step I Construction			
A	Silo			
I	Silo Tower	9 - Stories Total Floor Area of 2731.641 m^2	L.S.	
II	Silo Bins	Total Capacity of 33,976 T	L.S.	
III	Shed on Silo Bins	Floor Area of 1415 m^2	L.S.	
B	Other Buildings			
I	Warehouse	Floor Area of 874 m^2	L.S.	
II	Administration Building	Floor Area of 375 m^2	L.S.	
III	Guard House	Floor Area of 16 m^2	L.S.	
IV	Work Shop	Floor Area of 50 m^2	L.S.	
C	Mechanical Equipment of Silo			
I	Unloading Equipment			
1	Pneumatic Unloader	300 T/H 2 Nozzles Travelling-Type	1	
II	Intake Equipment			
1	Chain Conveyor on Pier No.1	330 T/H L=125 m 75 KW	1	

No.		Item	Specification	Quant.	Note
	2	Chain Conveyor on Pier N_o.2	330 T/H L=125 m 75 KW	1	
	3	Access Chain Conveyor	330 T/H L=34 m 30 KW	1	
	4	Chain Conveyor to Silo Tower	330 T/H L=10 m 7.5 KW	1	
	5	Intake Bucket Elevator	330 T/H H=33 m 55 KW	1	
	6	Rubble Separator	330 T/H 2.2 KW	1	
	7	Surge Bin Above Intake Hopper Scale	75 T - Capacity Made of Reinforced Concrete	1	
	8	Intake Hopper Scale	300 T/H 4 T/B	1	
	9	Hopper Under Intake Hopper Scale	6 T - Capacity	1	
	10	Bucket Elevator Above Silo Bin	330 T/H H=42.5 m 75 KW	1	
	11	Cross Chain Conveyor	330 T/H L=9 m 7.5 KW	1	
	12	Chain Conveyor on Silo Bins	330 T/H L=69 m 55 KW	2	Including 30 Slide Gates
	13	Two-Way Chute Valve on Silo Bins	330 T/H	16	
III		Discharging Equipment			
	1	Slide Gate Under Silo Bin	110 T/H Airtight Type	38	
	2	Chain Conveyor Under Silo Bins	110 T/H L=69 m 15 KW	3	
	3	Discharge Bucket Elevator	110 T/H H=40.5 m 22 KW	3	

No.		Item	Specification	Quant.	Note
	4	Surge Bin Above Discharge Hopper Scale	8 T - Capacity	3	
	5	Discharge Hopper Scale	110 T/H 1 T/B	3	
	6	Hopper Under Discharge Hopper Scale	1.5 T - Capacity	3	
	7	Distributor	110 T/H 5-Way 0.2 KW	3	
	8	Chain Conveyor to Bagging	110 T/H L=35 m 11 KW	1	Including A Slide Gate
	9	Return Chain Conveyor	110 T/H L=20 m 11 KW Double Trough Type	1	Including A Slide Gate
	10	Bargeloading Chain Conveyor No.1	330 T/H L=25 m 22 KW	1	
	11	Bargeloading Chain Conveyor No.2	330 T/H L=68 m 55 KW	1	
	12	Bargeloading Chain Conveyor No.3	330 T/H L=70 m 55 KW	1	
	13	Loader		1	
IV		Bagging Equipment			
	1	Surge Bin for Bagging	30 T - Capacity/Each	2	
	2	Belt Conveyor and Sewing Machine	L=6 m	1	
	3	Belt Conveyor	L=6 m	1	
V		Loading Equipment in Warehouse			
	1	Fork Lift Truck	2 T	2	
	2	Pallet		500	

No.		Item	Specification	Quant.	Note
VI		Dust Collecting Equipment			
	1	Dust Collector and Fan for Intake Equipment	160 m^3/min 250 mmAq	1	
	2	Dust Collector and Fan for Discharging Equipment	55 m^3/min 250 mmAq	3	
	3	Dust Collector and Fan for Bagging	20 m^3/min 250 mmAq	1	
VII		Automatic Sampling Equipment			
	1	Automatic Sampler		1	
	2	Sample Divider		1	
VIII		Test Equipment			
	1	Automatic Moisture Testor		2	
	2	Laboratory Grain Scale		2	
	3	Trip Balance Scale		2	
	4	Grain Sampler		1	
	5	Dockage Testor		2	
IX		Others			
	1	Hoist	5 T	1	
	2	Compressor		L.S.	

No.	Item	Specifixation	Quant.	Note
3	Bridge Between Silo Tower and Warehouse		1	
D	Electrical Equipment of Silo			
I	Metal Enclosed Switchgears	34.5 KV 3φ, 4W, 60 HZ	L.S.	
II	Main Transformer	34.5 KV/3.3 KV 3φ	1	
III	High Voltage Combination Starters	3.3 KV	L.S.	
IV	Power Transformer	3.3 KV/440 V 1φ	1	
V	Lighting Transformer	3.3 KV/220 V 1φ	1	
VI	Condenser	3.3 KV 3φ	2	
VII	Reactor	3.3 KV	2	
VIII	Central Operation Panel	Desk Type	1	
IX	Delivery Command Panel	Desk Type	1	
X	Motor Control Center	Self-Standing Type 440 V	L.S.	
XI	Sequence Controller	Self-Standing Type	L.S.	
XII	Delivery Indicating Device for Truck	Outdoor Used Water-Proof Type	L.S.	
XIII	Local Switch Panels		L.S.	
XIV	Grain Temperature Measuring Instruments		L.S.	Measuring 3 Points per Bin

No.			Item	Specification	Quant.	Note
E			Accessory Facilities			
	I		Fence, Gate, Parking		L.S.	
	II		Premises - Pavement		L.S.	
	III		Outdoor Lights		L.S.	
	IV		Water Supply, Drainage and Fire Hydrant		L.S.	
	V		Internal Communication Equipment		L.S.	
	VI		Survice Wire - Equipment		L.S.	
	VII		Diesel Generator and Peripheral Equipment		L.S.	
			Step II Construction			
A			Silo			
	I		Silo Bins	Total Capacity of 17,248 T	L.S.	
	II		Shed on Silo Bins	Floor Area of 700 m^2	L.S.	
B			Mechanical Equipment of Silo			
	I		Unloading Equipment			
		1	Pneumatic Unloader	300 T/H 2 Nozzles Travelling-Type	1	

No.		Item	Specification	Quant.	Note
II		Intake Equipment			
	1	Chain Conveyor on Pier No.1	330 T/H L=125 m 75 KW	1	
	2	Chain Conveyor on Pier No.2	330 T/H L=125 m 75 KW	1	
	3	Access Chain Conveyor	330 T/H L=37 m 30 KW	1	
	4	Chain Conveyor to Silo Tower	330 T/H L=22 m 15 KW	1	
	5	Intake Bucket Elevator	330 T/H H=33 m 55 KW	1	
	6	Rubble Separator	330 T/H 2.2 KW	1	
	7	Surge Bin Above Intake Hopper Scale	75 T - Capacity Made of Reinforced Concrete	1	
	8	Intake Hopper Scale	300 T/H 4 T/B	1	
	9	Hopper Under Intake Hopper Scale	6 T - Capacity	1	
	10	Bucket Elevator Above Silo Bin	330 T/H H=42.5 m 75 KW	1	
	11	Chain Conveyor on Silo Bins	330 T/H 55 KW	2	C.C (Step I) Extended 26 m Including 8 Slide Gates
	12	Two-Way Chute Valve on Silo Bins		16	

No.		Item	Specification	Quant.	Note
III		Discharging Equipment			
	1	Slide Gate Under Silo Bin	110 T/H Airtight Type	20	
	2	Chain Conveyor Under Silo Bins	110 T/H L=95 m 22 KW	6	3 Lines (Step I) Extended 26 m
	3	Discharge Bucket Elevator	110 T/H H=40.5 m 22 KW	3	
	4	Surge Bin Above Discharge Hopper Scale	8 T - Capacity	3	
	5	Discharge Hopper Scale	100 T/H 1 T/B	3	
	6	Hopper Under Discharge Hopper Scale	1.5 T - Capacity	3	
	7	Distributor	110 T/H 5 - Way 0.2 KW	3	
	8	Bargeloading Chain Conveyor No.1	330 T/H L=25 m 22 KW	1	
	9	Bargeloading Chain Conveyor No.2	330 T/H L=68 m 55 KW	1	
	10	Bargeloading Chain Conveyor No.3	330 T/H L=85 m 55 KW	1	
	11	Bargeloading Chain Conveyor No.4	330 T/H L=85 m 55 KW	1	
	12	Loader		1	
IV		Dust Collecting Equipment			
	1	Dust Collector and Fan for Intake Equipment	160 m^3/min x 250 mmAq	1	

No.		Item	Specification	Quant.	Note
	2	Dust Collector and Fan for Discharging Equipment	55 m^3/min 250 mmAq	3	
V		Automatic Sampling Equipment			
	1	Automatic Sampler		1	
	2	Sample Divider		1	
VI		Other			
	1	Compressor		L.S.	
C		Electrical Equipment of Silo			
I		Power Transformer	3.3 KV/440 V 3φ	1	
II		Condenser	3.3 KV 3 φ	1	
III		Reactor	3.3 KV	1	
IV		High Voltage Combination Starters	3.3 KV	1	
V		Central Operation Panel	Desk Type	1	
VI		Delivery Command Panel	Desk Type	1	
VII		Motor Control Center	Self-Standing Type 440 V	L.S.	
VIII		Sequence Controller	Self-Standing Type	L.S.	
IX		Delivery Indication Device for Truck	Outdoor Used Water-Proof Type	L.S.	

No.	Item	Specification	Quant.	Note
X	Local Switch Panels		L.S.	
XI	Grain Temperature Measuring Instruments		L.S.	Measuring 3 Points per Bin
D	Accessory Facilities			
I	Outdoor Lights		L.S.	
II	Internal Communication Equipment		L.S.	

Remarks

L.S. : Lump Sum
ϕ : Phase
W : Wire
T/H : Capacity of _____ Tons per Hour
L : Length
H : Height
T/B : Tons per Batch

Detailed Estimate Cost for Construction
Manila Grain Terminal

No.		Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
		Step 1 Construction			
A		Silo			
	I	Temporary Work	L.S.	2,080,000	
	II	Earthworks	L.S.	554,000	
	III	Foundation Construction Steel Pipe Pile ϕ=508mm L=24m	L.S. (666)	9,324,000	
	IV	Building Frame Construction Concrete Reinforcement Concrete Form	L.S. (13,100m^3) (2,450T) (76,600m^2)	12,000,000	
	V	Finish Work	L.S.	4,604,000	
	VI	Other Works	L.S.	63,000	
	VII	Lighting, Outlet and Air-Conditioner	L.S.	268,000	
	VIII	Passenger Elevator	1		250,000
	IX	Lightning Rods	L.S.	58,000	
	X	Foundation of Outdoor Chain Conveyor	L.S.	63,000	
		Sub Total		29,014,000	250,000
B		Other Buildings			
	I	Warehouse	L.S.	1,633,000	23,000

No.		Item	Quant.	Total Cost (₱) Local (₱) Currency	Foreign (₱) Currency
II		Administration Building	L.S.	1,007,000	
III		Guard House	L.S.	34,000	
IV		Work Shop	L.S.	84,000	
		Sub Total		2,758,000	23,000
C		Mechanical Equipment of Silo			
I		Unloading Equipment			
	1	Pneumatic Unloader	1	938,000	6,500,000
II		Intake Equipment			
	1	Chain Conveyor on Pier No.1	1	62,000	605,000
	2	Chain Conveyor on Pier No.2	1	89,000	629,000
	3	Access Chain Conveyor	1	19,000	190,000
	4	Chain Conveyor to Silo Tower	1		78,000
	5	Intake Bucket Elevator	1		381,000
	6	Rubble Separator	1		144,000
	7	Intake Hopper Scale	1		125,000
	8	Hopper Under Intake Hopper Scale	1	7,000	3,000
	9	Bucket Elevator above Silo Bin	1		475,000

No.	Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
10	Cross Chain Conveyor	1		75,000
11	Chain Conveyor on Silo Bins (Including Chute, Slide Gates and Stand on Silo Bins)	2	54,000	924,000
12	Two-Way Chute Valve on Silo Bins	16		88,000
13	Accessory of Silo Bin	L.S.		390,000
III	Discharging Equipment			
1	Slide Gate under Silo Bin	38		230,000
2	Chain Conveyor under Silo Bins (Including Chute under Silo Bins)	3	8,000	318,000
3	Discharge Bucket Elevator	3		714,000
4	Surge Bin above Discharge Hopper Scale	3	17,000	16,000
5	Discharge Hopper Scale	3		198,000
6	Hopper under Discharge Hopper Scale	3	10,000	8,000
7	Distributor	3		109,000
8	Chain Conveyor to Bagging (Including Slide Gate)	1		63,000
9	Return Chain Conveyor (Including Slide Gate)	1		55,000
10	Bargeloading Chain Conveyor No.1	1		126,000

No.		Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
	11	Bargeloading Chain Conveyor No.2	1	55,000	362,000
	12	Bargeloading Chain Conveyor No.3	1	45,000	360,000
	13	Loader	1		73,000
IV		Bagging Equipment			
	1	Surge Bin for Bagging	2	25,000	23,000
	2	Belt Conveyor and Sewing Machine	1		55,000
	3	Belt Conveyor	1		14,000
V		Loading Equipment in Warehouse			
	1	Forklift Truck	2		223,000
	2	Pallet	500	42,000	
VI		Dust Collecting Equipment			
	1	Dust Collector and Fan for Intake Equipment	1		91,000
	2	Dust Collector and Fan for Discharging Equipment	3		167,000
	3	Dust Collector and Fan for Bagging Equipment	1		46,000
	4	Dust Collecting Duct	L.S.	94,000	160,000
VII		Automatic Sampling Equipment			
	1	Automatic Sampler	1		22,000

No.		Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
	2	Sample Divider	1		22,000
VIII		Test Equipment			
	1	Test Equipment	L.S.		151,000
IX		Others			
	1	Hoist	1		121,000
	2	Compressor	L.S.		35,000
	3	Air-Piping	L.S.	28,000	45,000
	4	Bridge between Silo Tower and Warehouse	1	13,000	19,000
	5	Stand and Chute in Silo Tower	L.S.	140,000	75,000
	6	Other Accessory Equipment	L.S.	19,000	142,000
	7	Erection	L.S.	825,000	
	8	Painting at Site	L.S.	175,000	
		Sub Total		2,665,000	14,650,000
D		Electrical Equipment of Silo			
I		Metal Enclosed Switchgears	L.S.		1,235,000
II		Main Transformer	1		220,000
III		High Voltage Combination Starters	L.S.		308,000

No.	Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
IV	Power Transformer	1		43,000
V	Lighting Transformer	1		10,000
VI	Condenser	2		23,000
VII	Reactor	2		16,000
VIII	Central Operation Panel	1		280,000
IX	Delivery Command Panel	1		98,000
X	Motor Control Center	L.S.		630,000
XI	Sequence Controller	L.S.		550,000
XII	Delivery Indicating Device for Truck	L.S.		68,000
XIII	Local Switch Panels	L.S.		169,000
XIV	Grain Temperature Measuring Instruments	L.S.		408,000
XV	Wiring	L.S.	1,755,000	
	Sub Total		1,755,000	4,058,000
E	Accessory Facilities	L.S.	2,217,000	108,000
F	Spare Parts	L.S.		500,000
G	Design and Supervision Services	L.S.	171,000	1,267,000

No.	Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
	Total of Items A to G		38,580,000	20,856,000
H	Contingency (10% of A-G Total)	L.S.	3,858,000	2,086,000
I	Engineering Consulting Fee	L.S.	1,359,000	1,018,000
	Total of Items A to I		43,797,000	23,960,000
	Grand Total (L.C. + F.C.)		67,757,000	

No.		Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
		Step II Construction			
A		Silo			
	I	Temporary Work	L.S.	800,000	
	II	Earthworks	L.S.	213,000	
	III	Foundation Construction Steel Pipe Pile ϕ=508mm L=24m	L.S. (300)	4,200,000	
	IV	Building Frame Construction Concrete Reinforcement Concrete Form	L.S. ($5500m^3$) (1650T) ($35000m^2$)	4,685,000	
	V	Finish Work	L.S.	1,277,000	
	VI	Other Work	L.S.	38,000	
	VII	Lighting and Outlet	L.S.	63,000	
	VIII	Lightning Rods	L.S.	20,000	
	IX	Foundation of Outdoor Chain Conveyor	L.S.	63,000	
		Sub Total		11,359,000	
B		Mechanical Equipment of Silo			
	I	Unloading Equipment			
	1	Pneumatic Unloader	1	938,000	6,500,000

No.		Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
II		Intake Equipment			
	1	Chain Conveyor on Pier No.1	1	62,000	605,000
	2	Chain Conveyor on Pier No.2	1	89,000	629,000
	3	Access Chain Conveyor	1	19,000	197,000
	4	Chain Conveyor to Silo Tower	1		108,000
	5	Intake Bucket Elevator	1		381,000
	6	Rubble Separator	1		144,000
	7	Intake Hopper Scale	1		125,000
	8	Hopper Under Intake Hopper Scale	1	7,000	3,000
	9	Bucket Elevator Above Silo Bin	1		475,000
	10	Chain Conveyor on Silo Bins (Including Chute, Slide Gate, and Stand on Silo Bins)	2	22,000	289,000
	11	Two-Way Chute Valve on Silo Bins	8		44,000
	12	Accessory of Silo Bin	L.S.		204,000
III		Discharging Equipment			
	1	Slide Gate Under Silo Bin	20		121,000
	2	Chain Conveyor Under Silo Bins (Including Chute Under Silo Bins)	6	4,000	728,000

No.		Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
	3	Discharge Bucket Elevator	3		714,000
	4	Surge Bin Above Discharge Hopper Scale	3	17,000	16,000
	5	Discharge Hopper Scale	3		198,000
	6	Hopper Under Discharge Hopper Scale	3	10,000	8,000
	7	Distributor	3		109,000
	8	Bargeloading Chain Conveyor No.1	1		126,000
	9	Bargeloading Chain Conveyor No.2	1	49,000	357,000
	10	Bargeloading Chain Conveyor No.3	1	59,000	385,000
	11	Bargeloading Chain Conveyor No.4	1	49,000	366,000
	12	Loader	1		73,000
IV		Dust Collecting Equipment			
	1	Dust Collector and Fan for Intake Equipment	1		91,000
	2	Dust Collector and Fan for Discharging Equipment	3		167,000
	3	Dust Collecting Duct	1	65,000	120,000
V		Automatic Sampling Equipment			
	1	Automatic Sampler	1		22,000
	2	Sample Divider	1		22,000

No.		Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
VI		Other Equipment			
	1	Compressor	L.S.		35,000
	2	Air Piping	L.S.	24,000	45,000
	3	Stand and Chute in Silo Tower	L.S.	140,000	75,000
	4	Other Facilities	L.S.		21,000
	5	Erection	L.S.	608,000	
	6	Painting at Site	L.S.	170,000	
		Sub Total		2,332,000	13,503,000
C		Electrical Equipment of Silo			
I		Power Transformer	1		35,000
II		Condenser	1		9,000
III		Reactor	1		7,000
IV		High Voltage Combination Starters	1		100,000
V		Central Operation Panel	1		125,000
VI		Delivery Command Panel	1		58,000
VII		Motor Control Center	L.S.		380,000
VIII		Sequence Controller	L.S.		248,000

No.	Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
IX	Delivery Indicating Device for Truck	L.S.		68,000
X	Local Switch Panels	L.S.		120,000
XI	Grain Temperature Measuring Instruments	L.S.		255,000
XII	Remodeling	L.S.		21,000
XIII	Wiring	L.S.	1,064,000	
	Sub Total		1,064,000	1,426,000
D	Accessory Facilities	L.S.	16,000	
E	Design and Supervision Services	L.S.	57,000	1,078,000
	Total of Items A to E		14,828,000	16,007,000
F	Contingency (10% of A-E Total)	L.S.	1,483,000	1,600,000
G	Engineering Consulting Fee	L.S.	455,000	778,000
	Total of Items A to G		16,766,000	18,385,000
	Grand Total (L.C + F.C.)		35,151,000	

Remarks

L.C. : Local Currency
F.C. : Foreign Currency
ϕ : Diameter
L : Length

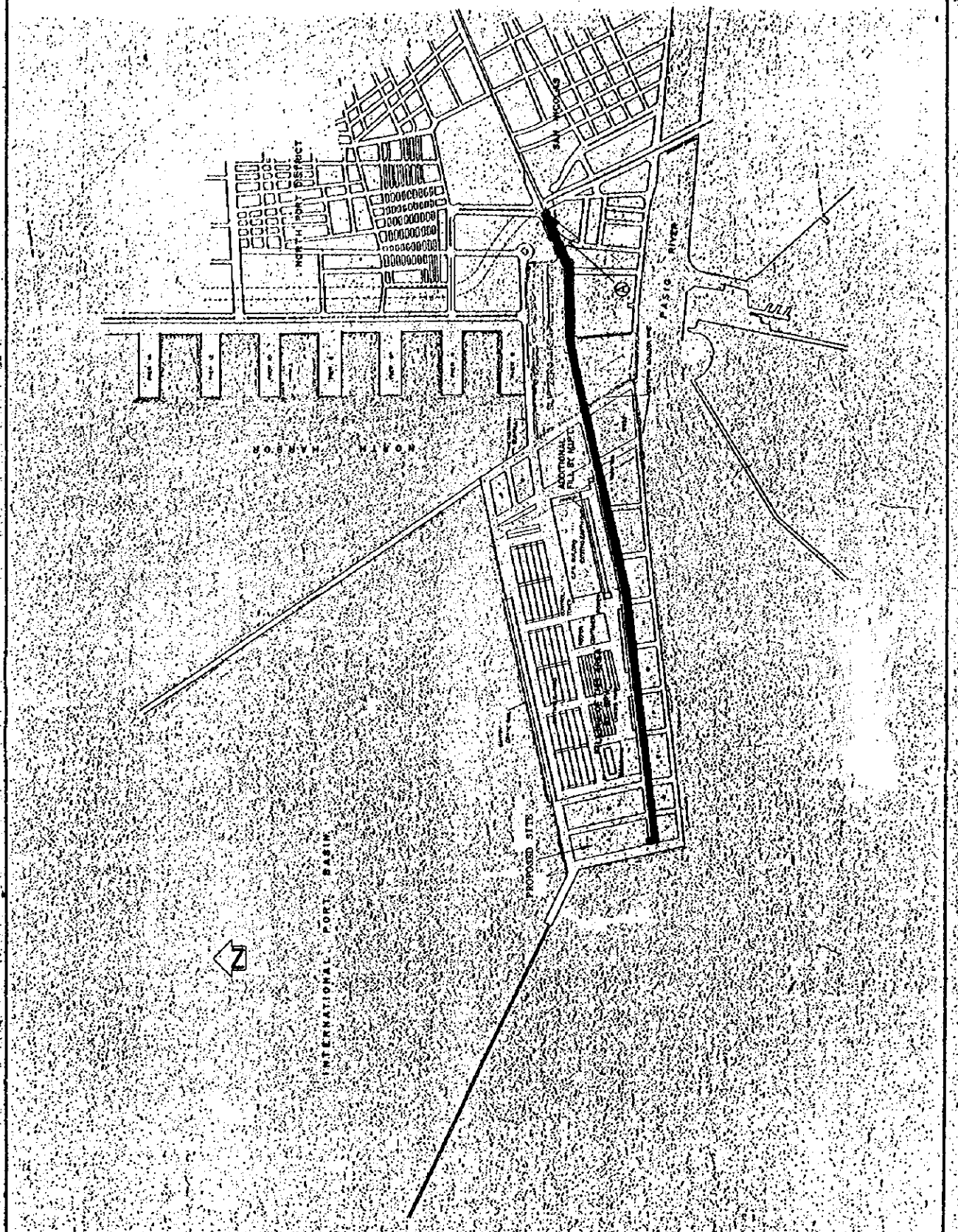
ANNEX 4-4

Standard Illuminance of Manila Grain Terminal

The standard illuminance of the indoor and outdoor illuminations shall be as follows.

Control room:	300 to 400 lux
Machine room and similar places:	200 "
Office and similar places:	300 to 450 "
Electric room:	200 to 300 "
Surroundings of Machine:	200 "
Overhead bridge and similar places	50 "
Operation span at night:	50 "
Pier:	50 "
Wharf:	50 "
Access road and premises:	10 "

Map of Supply Power Cable, Manila Grain Terminal



Manila Grain Terminal FINANCIAL CASH FLOW (1), INFLOW Unit: ₱1,000

Year	Year in a Row	Handling Charge		Import Fee (1.3%)	Bagging Charge	Total	For Sensibility Analysis	
		Wheat	Corn				(Import Fee 1.3% x 4/3)	Total
1978	1	0	0	0	0	0	0	0
79	2	0	0	0	0	0	0	0
80	3	4,545	1,740	6,630	60	12,975	8,840	15,185
81	4	4,680	1,815	6,827	60	13,382	9,103	15,658
82	5	4,815	1,890	7,023	60	13,788	9,364	16,129
83	6	4,965	1,965	7,242	60	14,232	9,656	16,646
84	7	5,130	2,055	7,483	60	14,728	9,977	17,222
85	8	5,280	2,130	7,702	60	15,172	10,269	17,739
86	9	5,415	2,220	7,899	60	15,594	10,532	18,227
87	10	5,580	2,310	8,139	60	16,089	10,852	18,802
88	11	5,730	2,400	8,358	60	16,548	11,144	19,334
89	12	5,895	2,580	8,599	60	17,134	11,465	20,000
90	13	6,075	2,685	8,861	60	17,681	11,815	20,636
91	14	6,195	2,790	9,036	60	18,081	12,048	21,093
92	15	6,315	2,895	9,211	60	18,481	12,281	21,551
93	16	6,450	3,030	9,408	60	18,948	12,544	22,084
94	17	6,570	3,135	9,583	60	19,348	12,777	22,542
95	18	6,705	3,255	9,780	60	19,800	13,040	23,060
96	19	6,825	3,405	9,955	60	20,245	13,273	23,563
97	20	6,960	3,525	10,152	60	20,697	13,536	24,081
98	21	7,080	3,675	10,327	60	21,142	13,769	24,584
99	22	7,215	3,810	10,524	60	21,609	14,032	25,117
2000	23	7,335	3,975	10,699	60	22,069	14,265	25,635
1	24	7,470	4,140	10,896	60	22,566	14,528	26,198
2	25	7,605	4,305	11,093	60	23,063	14,791	26,761
3	26	7,755	4,470	11,312	60	23,597	15,083	27,368
4	27	7,890	4,650	11,509	60	24,109	15,345	27,945
5	28	8,040	4,830	11,728	60	24,658	15,637	28,567
6	29	8,190	5,025	11,946	60	25,221	15,928	29,203
7	30	8,340	5,235	12,165	60	25,800	16,220	29,855
Total		181,050	89,940	264,087	1,680	536,757	352,114	624,784

Manila Grain Terminal

FINANTIAL CASH FLOW (2), OUTFLOW

Unit: ₱ 1,000

Year	Year in a Row	Construction Cost	Personnel Expense	Hatch Work Cost	Maintenance	Electricity	Insurance	Land Rent	Miscella-neous	Total	For Sensibility Analysis Construction Cost -10% Total	For Sensibility Analysis Construction Cost +10% Total
1978	1	20,782	0	0	0	0	0	112	66	20,900	18,822	22,978
79	2	46,975	103	0	0	0	0	112	11	47,201	42,503	51,899
80	3	0	258	52	759	398	678	112	113	2,370	2,371	2,370
81	4	0	258	54	812	407	673	112	116	2,432	2,432	2,432
82	5	0	258	54	867	418	649	112	118	2,476	2,476	2,476
83	6	0	258	56	921	429	635	112	121	2,532	2,532	2,532
84	7	0	258	58	1,443	44	622	112	147	3,081	3,081	3,081
85	8	8,552	258	60	1,029	451	615	112	126	11,203	10,348	12,058
86	9	26,599	258	62	1,083	462	603	112	129	29,308	26,648	31,968
87	10	0	273	64	1,093	513	943	112	150	3,148	3,148	3,148
88	11	0	273	66	1,181	523	918	112	154	3,227	3,227	3,227
89	12	0	273	70	3,295	537	894	112	259	5,440	5,440	5,440
90	13	0	273	72	1,358	549	891	112	163	3,418	3,418	3,418
91	14	0	273	74	1,447	559	869	112	167	3,501	3,501	3,501
92	15	0	273	76	1,535	568	848	112	171	3,583	3,583	3,583
93	16	0	273	78	1,623	580	828	112	175	3,669	3,669	3,669
94	17	0	273	80	5,566	589	808	112	371	7,799	7,799	7,799
95	18	0	273	82	1,746	600	828	112	182	3,823	3,823	3,823
96	19	0	273	84	3,563	611	810	112	273	5,726	5,726	5,726
97	20	0	273	86	1,815	623	810	112	186	3,905	3,905	3,905
98	21	0	273	88	1,819	634	792	112	186	3,904	3,904	3,904
99	22	0	273	90	9,463	646	775	112	568	11,927	11,927	11,927
2000	23	0	273	94	1,824	656	834	112	190	3,983	3,983	3,983
01	24	0	273	96	4,191	670	816	112	308	6,466	6,466	6,466
02	25	0	273	98	1,831	683	822	112	191	4,010	4,010	4,010
03	26	0	273	100	1,834	696	805	112	191	4,011	4,011	4,011
04	27	0	273	104	6,861	708	788	112	442	9,288	9,288	9,288
05	28	0	273	106	1,840	723	820	112	194	4,068	4,068	4,068
06	29	0	273	108	8,539	738	803	112	529	11,102	11,102	11,102
07	30	0	273	112	1,845	753	853	112	197	4,145	4,145	4,145
Total		102,908	7,642	2,224	71,183	16,165	22,030	3,360	6,134	231,646	221,356	241,937

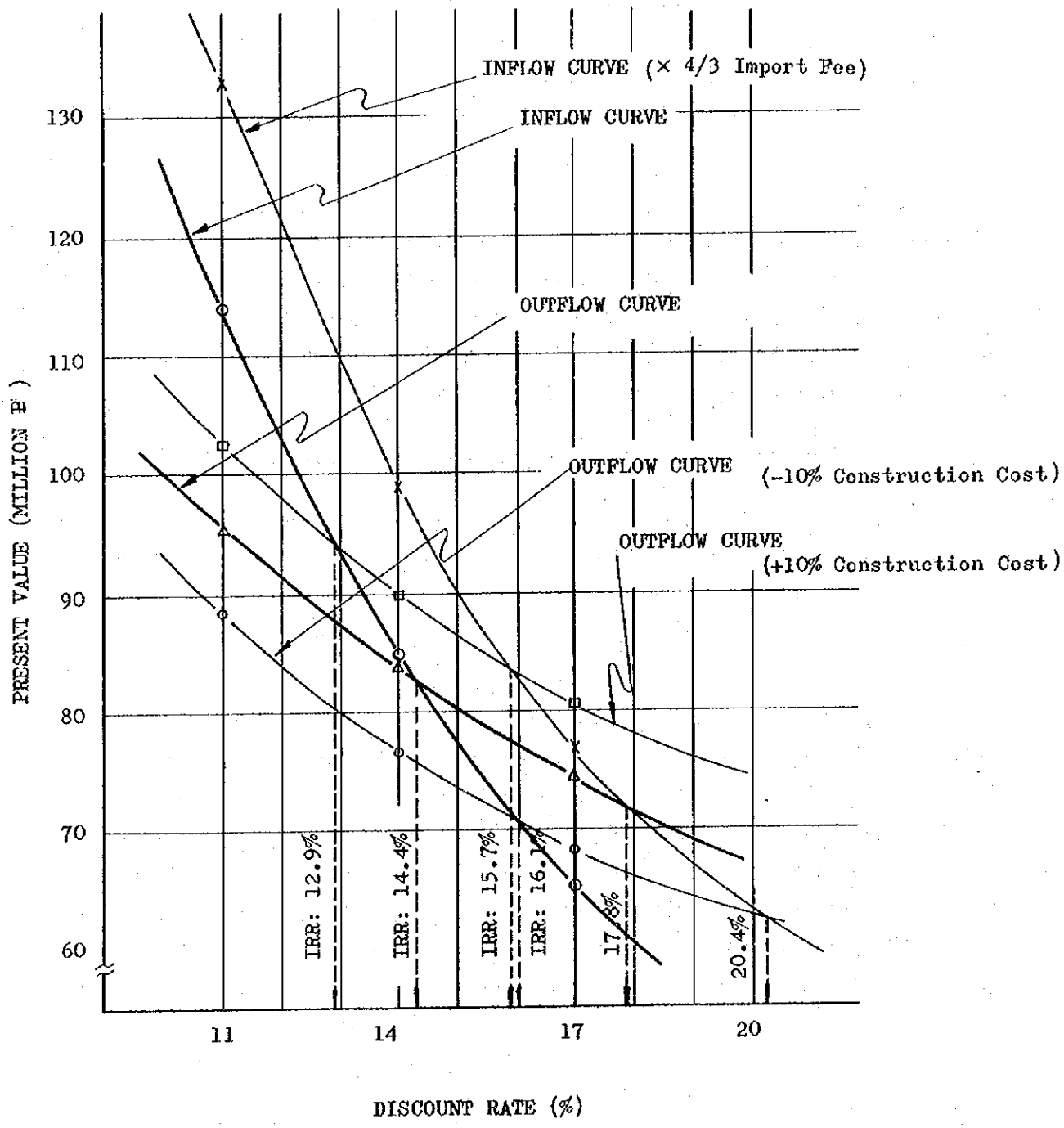
Manila Grain Terminal FINANCIAL CASH FLOW (3) NET FLOW Unit : ₱ 1000

Year	Year in a Row	Total		Net Cash Flow		Outflow Currency	
		Inflow	Outflow	Yearly	Accumulated Amount	Local	Foreign
1978	1	0	20,900	△20,900	△20,900	13,108	7,792
79	2	0	47,201	△47,201	△68,101	31,033	16,168
80	3	12,975	2,371	10,604	△57,497	2,295	76
81	4	13,382	2,432	10,950	△46,547	2,351	81
82	5	13,788	2,476	11,312	△35,235	2,389	87
83	6	14,232	2,532	11,700	△23,535	2,440	92
84	7	14,728	3,081	11,647	△11,888	2,610	471
85	8	15,172	11,203	3,969	△ 7,919	6,505	4,698
86	9	15,594	29,308	△13,714	△21,633	15,410	13,898
87	10	16,080	3,148	12,941	△ 8,692	3,004	144
88	11	16,548	3,227	13,321	4,629	3,074	153
89	12	17,134	5,440	11,694	16,323	3,659	1,781
90	13	17,681	3,418	14,263	30,586	3,248	170
91	14	18,081	3,501	14,580	45,166	3,323	178
92	15	18,481	3,583	14,898	60,064	3,396	187
93	16	18,948	3,669	15,279	75,343	3,474	195
94	17	19,348	7,799	11,549	86,892	4,582	3,217
95	18	19,800	3,823	15,977	102,869	3,616	207
96	19	20,245	5,726	14,519	117,388	4,090	1,636
97	20	20,697	3,905	16,792	134,180	3,692	213
98	21	21,142	3,904	17,238	151,418	3,691	213
99	22	21,609	11,927	9,682	161,000	5,600	6,327
2000	23	22,069	3,983	18,086	179,186	3,770	213
01	24	22,566	6,466	16,100	195,286	4,363	2,103
02	25	23,063	4,010	19,053	214,339	3,797	213
03	26	23,597	4,011	19,586	233,925	3,798	213
04	27	24,109	9,288	14,821	248,746	5,055	4,233
05	28	24,658	4,068	20,590	269,336	3,855	213
06	29	25,221	11,102	14,119	283,455	5,528	5,574
07	30	25,800	4,145	21,655	305,110	3,932	213
		536,757	231,647	305,110		160,688	70,959

MANILA GRAIN TERMINAL

PRESENT VALUE INFLOW-OUTFLOW CURVE

(FINANCIAL)



Assumption of Economic Analysis of the Grain Terminal in Manila

1. Economic benefits

(1) Reduction in spoilage

Substantial spoilage of imported wheat in stock is inherent to the existing conventional type of warehouse now used for storing the wheat, whereas the latest modern terminal can prevent it. Thus, reduction in spoilage is counted as one of the economic benefits derived from the construction of terminal.

It is assumed that a stock of 15,000 tons will go through 4 turnovers a year and that a spoilage of 0.5 percent will take place each time. This percentage rate would never be reduced even with the most appropriate practical device put on the best conventional type warehouse. Based on the estimated CIF price $160.43/LT (P1,176/MT) of the stock in October, 1976, the reduction in spoilage amounts to an annual rate of:

$$P1,176/MT \times 15,000 \text{ tons} \times \frac{0.5}{100} \times 4 = P352,800$$

Once the volume of stock is doubled in 1987, the amount of spoilage to be saved as above can of course be doubled accordingly.

(2) Reduction in spillage

The current spillage is assessed to be around 0.7 percent for imported wheat handled by the present cargo working system. Undoubtedly one of the favourable economic benefitsis that the terminal can prevent spillage loss with the use of its pneumatic unloader. This benefit is certainly available to the handling of feed grain so that we can estimate as a reduction in spillage, 0.7 percent of the total handling volume of wheat and feed grain. The price adopted for estimation of spillage cutting is the above-mentioned CIF price for wheat and FOB price $105/MT of Thai corn as an asssumed export FOB price of feed grain from the Philippines.

(3) Saving on barges

One day's basic lighterage can be saved by increase of barge loading capacity. As those barges and tug boats saved can certainly be diverted for other purposes, the total saving of lighterage is considered to generate a economic benefit of P4.17/ton as follows:

Basic rate of barge	P1.5/ton
Tug-boat rate	P2.67/ton
Total	P4.17/ton

(4) Saving on ocean freight

As is explained in the Section 3.2.2, the ocean freight is largely dependent upon the size of unloading volume capacitated by the port facilities. The completion of the terminal is expected to increase this figure from 1,000 tons currently available to 2,000 tons. While this difference of 1,000 tons can eliminate the freight between the Pacific coast of the North America and Manila by about $2/LT, the economic benefit for this analytical purpose is conservatively estimated to be $1.5/LT or P11/MT, as import wheat is usually unloaded at a few ports, the unloading efficiency of which other than Manila is not so high. The amount of ocean freight saved is calculated by multiplying this P11/MT by the total volume of imported wheat.

(5) Saving on stevedoring

The terminal will eliminate the present stevedoring which means to save power and labour with no need to operate grab-bucket, portable unloader, etc. The current stevedorage, P10.49/MT, (including the charges incurred by use of the foregoing machinery and equipment) is counted as an economic benefit. (cf. Annex 3-8 (2/2))

2. Economic costs

All the expenditures estimated in the financial analysis are also included in the economic analysis except for the electricity cost. In this economic analysis, the electricity cost consists of only fuel,

labour cost and depreciation of facilities for generation and transmission which is equivalent to 68 percent of the electricity cost in the Philippines.

Manila Grain Terminal ECONOMIC CASH FLOW (1) INFLOW Unit : ₱ 1000

Year	Year in a Row	Reduction in Spoilage	Reduction in Spillage	Saving on Freight	Saving on Barge	Saving on Stevedoring	Total
1978	1	0	0	0	0	0	0
79	2	0	0	0	0	0	0
80	3	353	3,126	3,333	1,264	3,178	11,254
81	4	353	3,227	3,432	1,301	3,273	11,586
82	5	353	3,329	3,531	1,339	3,367	11,919
83	6	353	3,440	3,641	1,380	3,472	12,286
84	7	353	3,566	3,762	1,426	3,588	12,695
85	8	353	3,672	3,872	1,468	3,692	13,057
86	9	353	3,780	3,971	1,505	3,787	13,396
87	10	706	3,903	4,092	1,515	3,902	14,154
88	11	706	4,018	4,202	1,593	4,007	14,526
89	12	706	4,175	4,323	1,639	4,123	14,966
90	13	706	4,312	4,455	1,689	4,248	15,410
91	14	706	4,417	4,543	1,722	4,332	15,720
92	15	706	4,519	4,631	1,756	4,416	16,028
93	16	706	4,641	4,730	1,793	4,511	16,381
94	17	706	4,746	4,818	1,826	4,595	16,691
95	18	706	4,865	4,917	1,864	4,689	17,041
96	19	706	4,987	5,005	1,897	4,773	17,368
97	20	706	5,103	5,104	1,935	4,867	17,715
98	21	706	5,223	5,192	1,968	4,951	18,040
99	22	706	5,348	5,291	2,006	5,046	18,397
2000	23	706	5,471	5,379	2,039	5,130	18,725
1	24	706	5,607	5,478	2,077	5,224	19,092
2	25	706	5,740	5,577	2,114	5,318	19,455
3	26	706	5,883	5,687	2,156	5,423	19,855
4	27	706	6,023	5,786	2,193	5,518	20,226
5	28	706	6,170	5,896	2,235	5,623	2,0630
6	29	706	6,325	6,006	2,277	5,728	21,042
7	30	706	6,482	6,116	2,319	5,832	21,455
Total		17,297	132,098	132,770	50,332	126,613	459,110

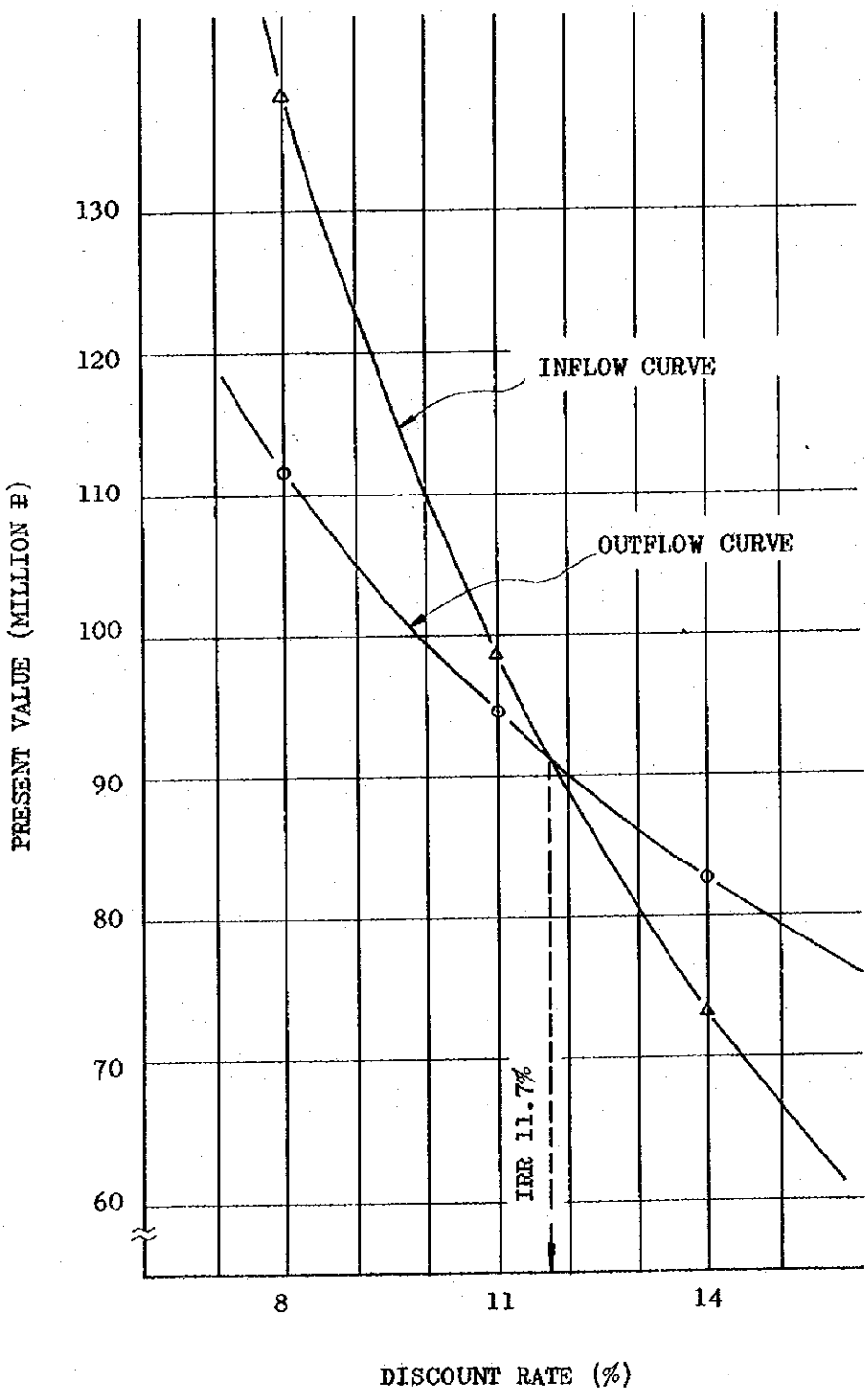
Manila Grain Terminal ECONOMIC CASH FLOW (2) OUT FLOW Unit:P 1,000

Year	Year in a Row	Construction Cost	Personnel Expense	Hatch Work Cost	Maintenance	Electricity	Insurance	Land Rent	Miscella -neous	Total
1978	1	20,782	0	0	0	0	0	6	6	20,900
79	2	46,975	103	0	0	0	678	112	11	47,201
80	3	0	258	52	759	271	678	112	113	2,243
81	4	0	258	54	812	277	673	112	116	2,302
82	5	0	258	54	867	285	649	112	118	2,343
83	6	0	258	56	921	292	635	112	121	2,395
84	7	0	258	58	1,443	300	622	112	147	2,940
85	8	8,552	258	60	1,029	307	615	112	126	11,059
86	9	26,599	258	62	1,083	314	603	112	129	29,160
87	10	0	273	64	1,093	350	943	112	150	2,985
88	11	0	273	66	1,181	356	918	112	154	3,060
89	12	0	273	70	3,295	365	294	112	259	5,268
90	13	0	273	72	1,358	373	891	112	163	3,242
91	14	0	273	74	1,447	380	869	112	167	3,322
92	15	0	273	76	1,535	386	848	112	171	3,401
93	16	0	273	78	1,623	394	828	112	175	3,483
94	17	0	273	80	5,566	400	808	112	371	7,610
95	18	0	273	82	1,746	408	828	112	182	3,631
96	19	0	273	84	3,563	415	810	112	273	5,530
97	20	0	273	86	1,815	423	810	112	186	3,705
98	21	0	273	88	1,819	431	792	112	186	3,701
99	22	0	273	90	9,463	439	775	112	568	11,720
2000	23	0	273	94	1,824	445	834	112	190	3,772
01	24	0	273	96	4,191	455	816	112	308	6,251
02	25	0	273	98	1,831	463	822	112	191	3,790
03	26	0	273	100	1,834	472	805	112	191	3,787
04	27	0	273	104	6,861	480	788	112	442	9,060
05	28	0	273	106	1,840	490	820	112	194	3,835
06	29	0	273	108	8,539	500	803	112	529	10,864
07	30	0	273	112	1,845	510	853	112	197	3,902
Total		102,908	7,642	2,224	71,183	10,981	22,030	3,360	6,134	226,462

MANILA GRAIN TERMINAL

PRESENT VALUE INFLOW-OUTFLOW CURVE

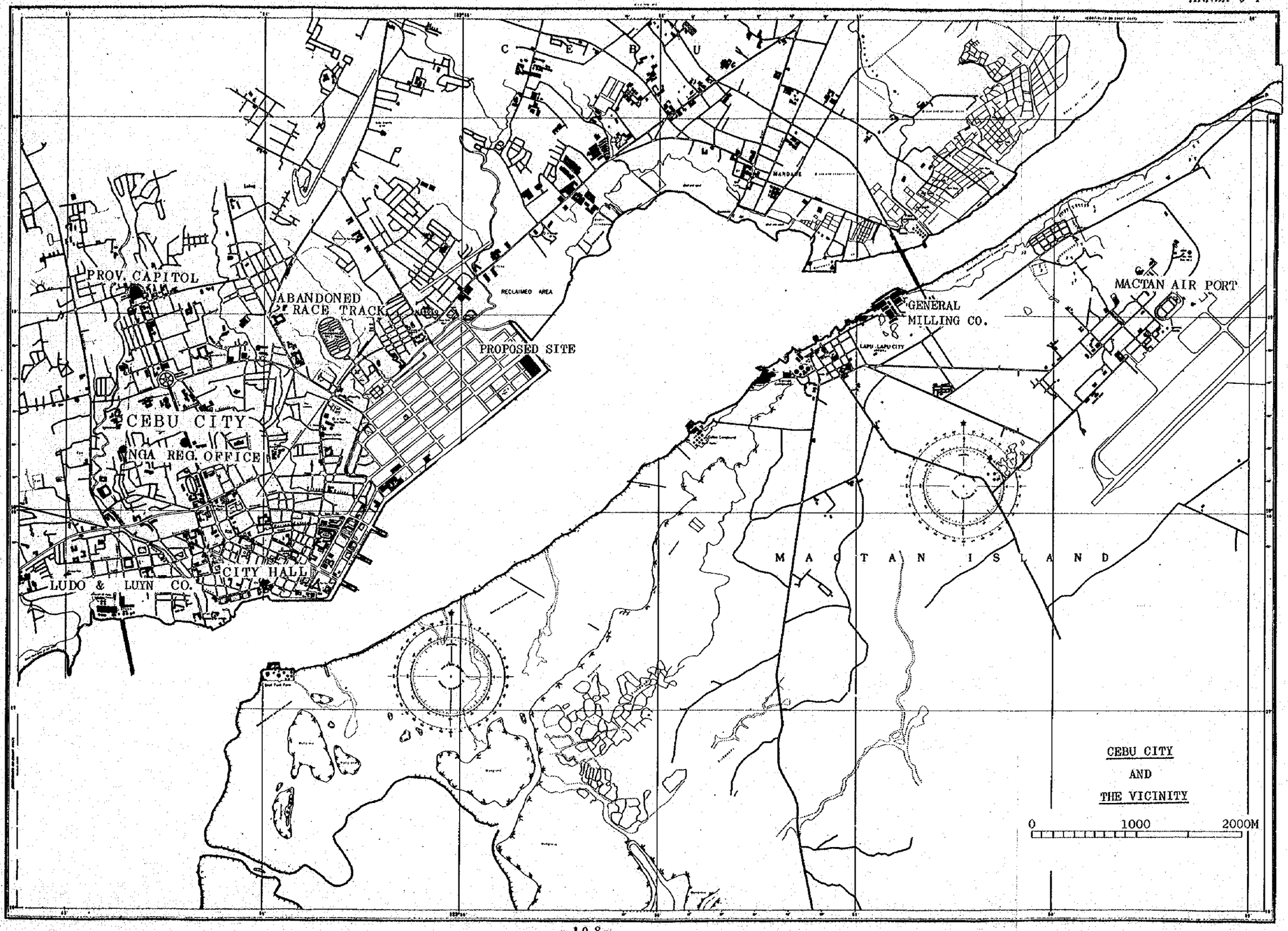
(ECONOMIC)



VI GRAIN TERMINAL PROJECT IN CEBU

VII SPECIFICATIONS OF THE GRAIN TERMINAL FACILITIES IN CEBU

VIII FINANCIAL AND ECONOMIC ANALYSES OF THE GRAIN TERMINAL IN CEBU


C E B U
PROV. CAPITOL
ABANDONED
RACE TRACK
RECLAIMED AREA
PROPOSED SITE
CEBU CITY
NGA REG. OFFICE
CITY HALL
LUDO & LUYN CO.
MANDAUE
LAPU-LAPU CITY
GENERAL
MILLING CO.
MACTAN AIR PORT
M A C T A N I S L A N D
CEBU CITY
AND
THE VICINITY
0
1000
2000M

ANNEX 6-2(1/1)

Volume of Incoming NGA and Commercial Cereals
in the Province of Cebu

(1000 MT)

Cereal Variety	1974			1975			1976 (As of Oct.)		
	NGA	Comm'l	Total	NGA	Comm'l	Total	NGA	Comm'l	Total
Corngrains : Local (W)		425	425.0	18.6	307.5	326.1	18.6	262.6	281.2
Imported	12.5		12.5	30.6		30.6	9.1		9.1
Corngrits : Local	5.8	12.1	17.9	11.4	17.0	28.4	7.8	6.0	13.8
Rice : Imported	22.5		22.5	35.0		35	0.8		0.8
: Local	1.5	16.3	17.8	5.6	24.9	30.5	7	19.1	26.1
Palay		0.3	0.3	0.1	0.5	0.6	0.4	0.7	1.1
Darak									
Wheat Flour				0.2		0.2			
Wheat Grains				67.4		67.4	80.7		80.7
Soybeans									
Sorghum : (Imported)				5.8		5.8	1.2		1.2
C/Binlod					9.7	9.7		7.5	7.5
C/Bran					4.8	4.8		2.8	2.8
C/Germ					0.9	0.9		1.6	1.6
C/Tiktik					1.1	1.1		1.5	1.5
R/Bran					0.5	0.5		0.4	0.4
R/Tikitiki					0.1	0.1			
Total	42.3	453.8	496.1	174.6	367.1	541.7	125.5	302.2	427.7

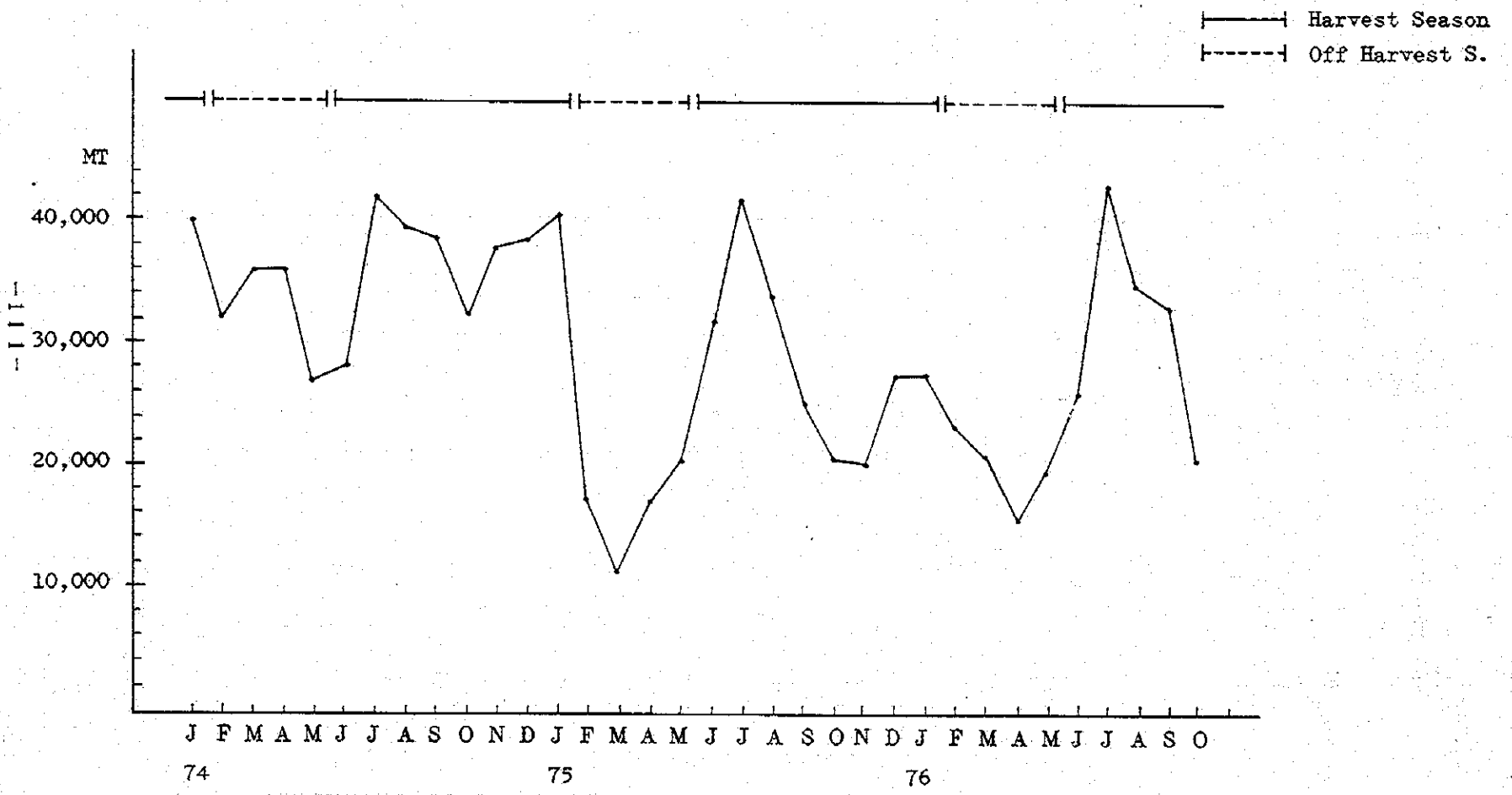
Volume of Outgoing NGA and Commercial Cereals
from the Province of Cebu

(1000 MT)

Cereal Variety	1974			1975			1976 (As of Oct.)		
	NGA	Comm'l	Total	NAG	Comm'l	Total	NGA	Comm'l	Total
Corngrits	3.5	99.8	103.3	7.3	64.3	71.6	17.3	60.3	77.6
Rice Local	21.6	3.7	25.3	26.3	2.7	29.0	6.5	4.3	10.8
Corngrains : Imported							9.7		9.7
: Local				1.2		1.2	1.0		1.0
Sorghum							0.8		0.8
C/Binlod					0.3	0.3		0.4	0.4
Palay									
C/Tiktik					0.4	0.4		0.4	0.2
C/Germ					0.7	0.7		0.2	0.2
C/Bran					1.4	1.4	0.4	1.3	1.7
C/Starch					5.6	5.6		6.9	6.9
C/Gluten Feeds					4.9	4.9		5.0	5.0
Hard Bran/Polland (Wheat)									
Soft Bran/Polland (Wheat)									
Mixed Bran/Pollard (Wheat)									
Total	25.1	103.5	128.6	34.8	80.4	115.3	36.4	78.6	114.9

Monthly Volume of Incoming NGA and Commercial Corn Grain

CEBU Province



ANNEX 6-4(1/1)

ANNEX 6-5(1/1)

Volume of Incoming Commercial Corngrain and Rice by Source

Cebu Province

(1000 MT)

SOURCES	Corn Grain		Rice		
	1974	1975	1974	1975	
Davao City	103	87	1	4	
Gen. Santos	156	87		5	
Cagayan de Oro	106	83	1	1	
Mati Davao	14	18			
Cotabato City	14	13			
Ozamats City	12	5			
Butuan City	2	4			
Pagadian City		2			
Zamboanga City	3	2			
Calbayag City		1			
Dipolog City	4	1			
Manila	2	1	1	2	
Catbalogan Samar		1			
Ormoc City		1	4		
Zamboanga Sur	3				
Iligan	2				
Negros Oriental	1				
Iloilo	1		1	1	
Bohol			2	1	
Ozamis			2		
Dadiangas			3		
Northern Leyte				5	
Southern Leyte				3	
Misamis Occidental				2	
Cotabato				1	
Others	4	1	1	0	
Total	425	307	16	25	

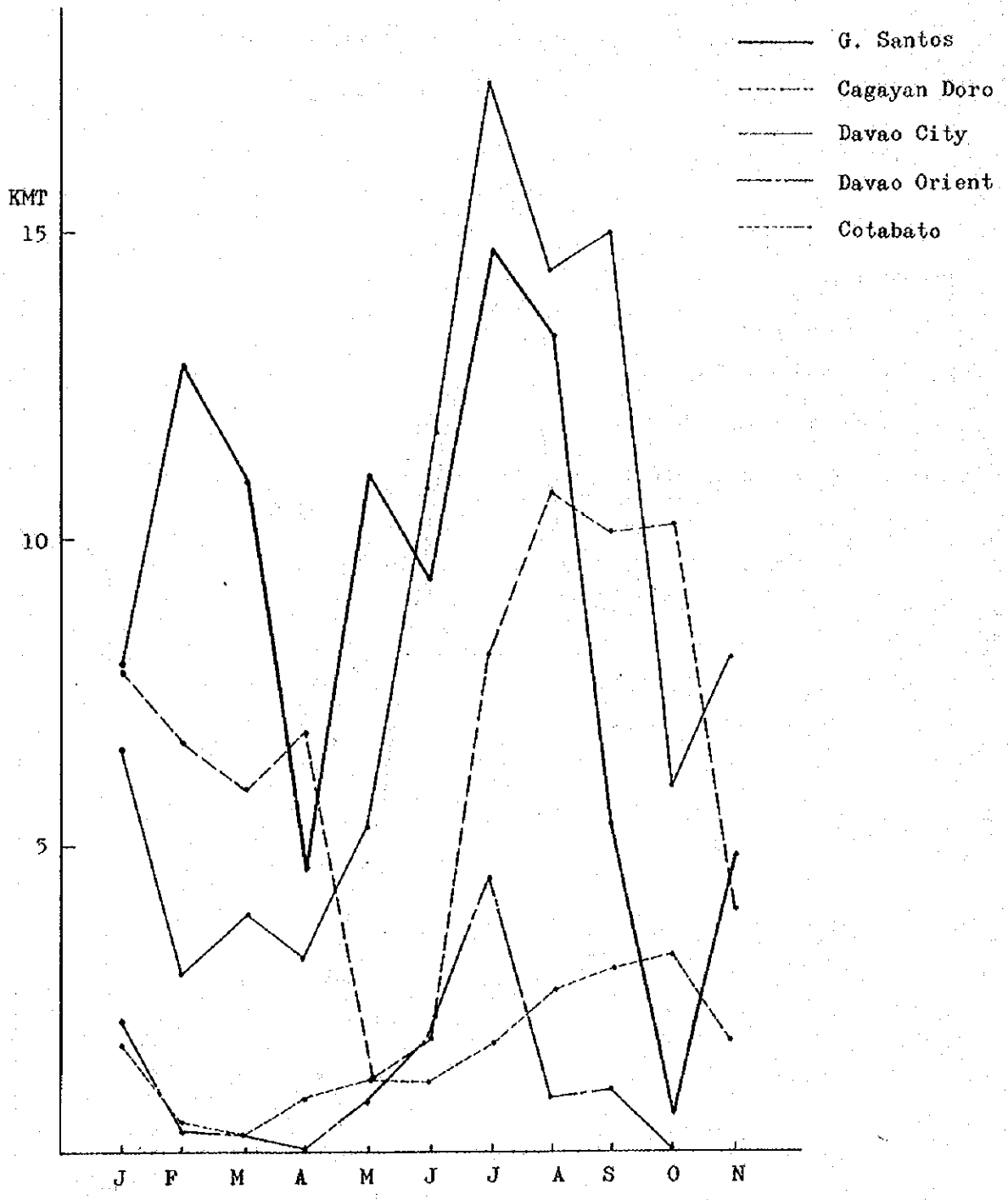
ANNEX 6-6(1/1)

Volume of Outgoing Commeroial Corngrits by Destination

Cebu Province

(1000 MT)

Destination	1974	1975	
Northern Leyte	34.7	22.4	
Negros Occidental	25.9	6.4	
Bohl	7.3	8.9	
Surigao Del Norte	5.3	1.7	
Masbate	4.2	5.8	
Legaspi	2.6	0.8	
Iloilo	2.6	-	
Northern Samar	4.5	2.0	
Southern Leyte	3.6	7.3	
Manila	1.0		
Siquizor	1.5	0.8	
Súrigao Del Sur	1.5	0.8	
Western Samar	1.3	3.8	
Butan	0.5	-	
Negros Oriental	0.7	-	
Romblon	0.6	0.6	
Zamboanga Del Norte	-	1.7	
Others	1.8	1.3	
Total	99.8	64.3	

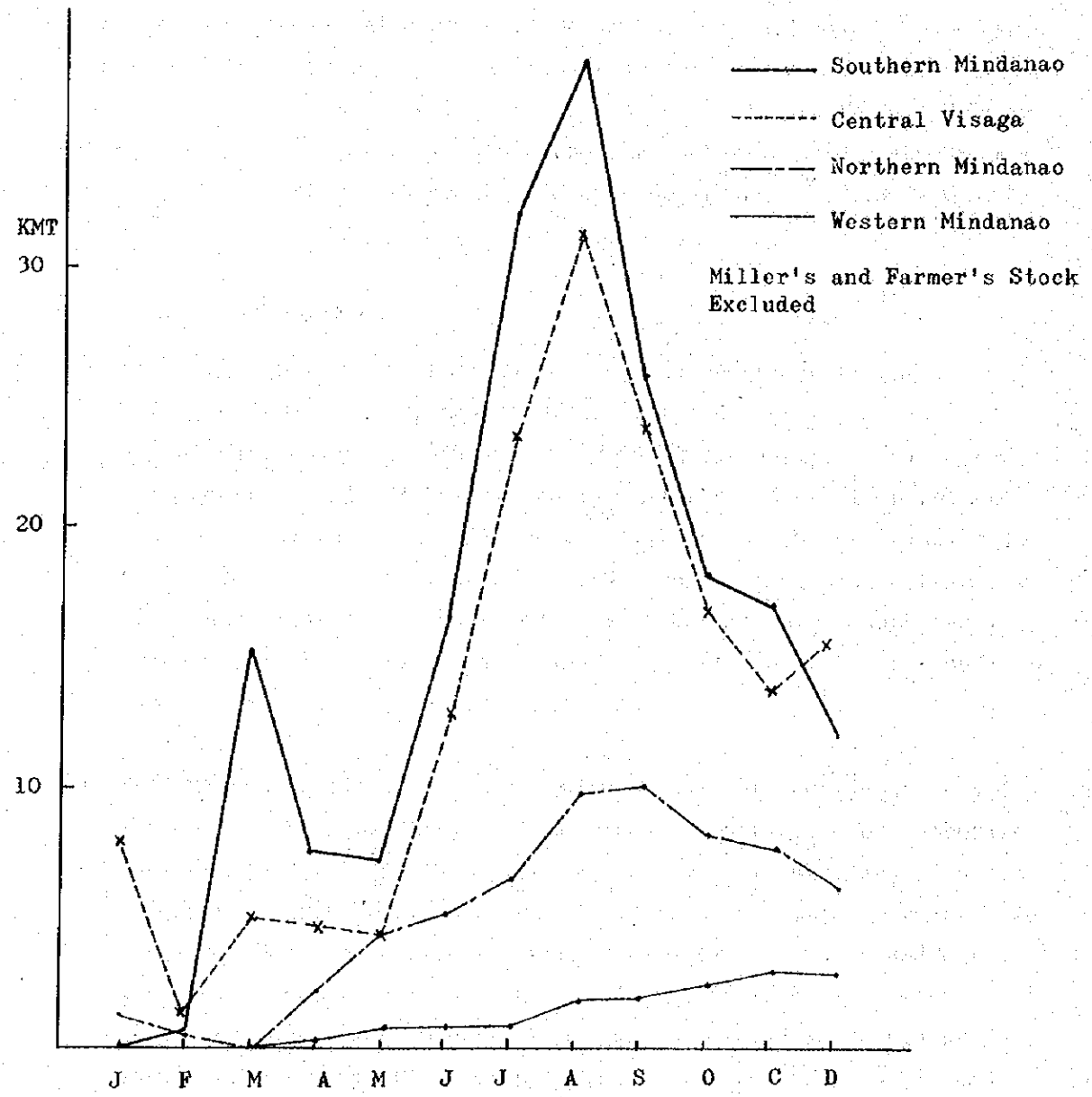


Montly Volume of Outgoing Corngrain by Major Ports

1976

Monthly Commercial Corngrains Stock Inventory

By Regions 1975



Unloading of Commercial Corn at the Terminal Silo in Cebu

1. Need for large-volume unloading of commercial corn

It is desirous for the purpose of improving profitability of the terminal silo in Cebu incorporated in this project that an active endeavour is to be made to increase the volume of unloaidng of commercial corn. For an additional cost required is rather small even with an increase in bulk unloading of commerical corn because of substantial unused capacity of the pneumatic unloader and, moreover, it may be possible to unload through this terminal silo those huge amount of inflowed commercial corn in bag after making them in bulk depending on commerical conditions.

2. Steps for promotion

(1) The management of the terminal silo needs to be recognized for easier adoption of opinions from the private sector.
Mutual confidence between NGA and pricate companys or individuals is undoubtedly of vital importance. A large amount of investment will be required for enabling themselves to use this terminal silo with a definite view of future improvement to ensure smooth supply and transportation of their corn. This is the reason that their opinions should be referred to and made full use of for the operational management of the terminal silo.

(2) The existing quality standards for corn now, are not adequate yet for corn in bulk handling. It is urged to institute and authorize quality standards and inspection system for bulk handling of grain. In order to promote transaction and distribution of commercial corn in bulk and to make effective use of this terminal silo and carrying vessels and temporary silo facilities, it is by all means necessary to provide an appropriate basis for varied consignors to consign their respective cargo in the same hutch or silo-bin and to regain them by adequate measurement with clear distribution.

It is necessary that the consignors receive the corn, the quality of which in identical with what they have expected, at the time of delivery from the terminal. For the purpose to enhance this, an establishment of insepction system of quality standards and general understanding thereof will be absolutely essential for sufficient guarantee that there would be seldom difference in quality as long as falling in the same standard.

(3) Need for private corn millers to have silos for receiving delivery

Private corn millers have in general warehouses for raw materials stores in their factories, which are temporarily apt to have at the peak time of harvesting stock equal to three month's requirement. As the silo facilities are expensive, it is scarcely necessary to hold such a silo as to have sufficient capacity to store the maximum volume of stock. There is an alternative way of storing parts of the corn in the silo and the rest in the warehouse in bags. There is such an example that a certain prominent corn-starch and corn-oil manufacturer receives delivery of corn in bag to store in a silo with a capacity of two months' material which is installed in its plant site.

(4) Need for lorry to carry corn in bulk

It is necessary to provide such an improved dump truck that is well equipped to prevent corn from getting wet and scattering.

(5) Need for installing corn loading facilities at the port of shipment

The facilities are to be intalled in Mindanao. It would no doubt be better if there will be available terminal silos which are planned to be built at 11 ports by NGA.

(6) Existing vessels are available for carrying corn in bulk

Barge type vessels are more desirable. This sort of vessel is now in service of transporting corn in bag from Mindanao and also

partially carrying to deliver corn in bulk to the feed grain millers upon the River Pasig from Mindanao. There are more than 1,500 barge type vessels, with average tonnage of about 350 tons, in the Philippines (excluding those for harbours and rivers).

Lower rate of freight can be expected for unloading at the grain terminal because of its exclusive use for corn and shortened unloading time.

3. Increase in profits of terminal silo

As mentioned in 8.2.5 and Annex 8-3, the profits will rise remarkably by increasing the handling of corn in the private sector.

Projected Volume of Handling at Grain Terminal in Cebu

(1) The amount of grain inflow from 1974 to October 1976 in Cebu province is shown in Annex 6-2. Almost all the figures in this annex represent the quantity handled at Cebu Port. The figures related only to corn have been chosen as follows:
However, corn grits are converted into corn grain at 68% milling recovery and the figures in 1976 are calculated as 1.2 times as much the figures in October 1976, which are the latest available figures in 1976. (The unit is 1,000 T.)

	NGA Local	NGA Import	Commercial	Total
1974	9	13	443	465
1975	35	31	332	398
1976	36	9	326	371
Mean	27	18	367	412

As the standard for calculation, it is assumed that total inflow of corn into Cebu in 1976 be at 412 KT and for NGA's corn used for processing into grits as at 36 KT.

(2) Out of the aggregate quantity of corn grain inflow, the following amount is estimated to be used for feed and starch. (1,000 KT annually)

General Milling Co.	for starch	20
	for feed	15
Ludo and Luyn Co.	for starch	35
Others		2
	Total	72

Therefore, the corn grain used for processing into corn grits can be estimated as follows.

Covering the amount handled by NGA and the private sector together,

412 - 72 = 340 KT

(3) NGA's intervention into the corn grits market having begun in 1974, its full-fledged activities could not be seen until after 1975. As mentioned above (2), total corn grain inflow used for corn grits at Cebu port is 340 KT and the amount of corn grain handled by NGA is 36 KT.
Therefore, the ratio of NGA to the total amount is 36 ÷ 340 = 10.6%. This rate is likely to continue for some time.

(4) Having their own private wharf, General Milling Co. and Ludo & Luyn Co. unload grains very effciently. Besides the above mentioned corn grain for starch and feed, 20 KT of corn used for corn grits are also unloaded here by General Milling Co.
Consequently, the amount of corn grain unloaded at public wharf in Cebu port is estimated to be 340 - 20 = 320 KT per year.

(5) The figures of corn inflow for corn grits unloaded at public wharf in Cebu port in the future are projected in the table at the end of Annex 6-10. However, the corn inflow handled both by NGA and the private sector is regarded to increase in proportion to the increase of population in Central Visayas region. The forecast of population increase in Central Visayas is shown in Annex 1-5.

(6) When the projected grain terminal silo is completed, 90% of corn handled by NGA shall be unloaded and stored in bulk in this grain terminal silo. The remaining 10% shall be unloaded in bags as before without utilizing the projected facilities. Those remainders consist of corn grain which cannot be unbagged, having loaded from ports other than main ports such as Davao, General Santos and Cagayan De Oro and of others which are delivered to the Cebu port in corn grain or corn grits themselves. The forecasted figures of those classified by year are shown at the last table of this Annex 6-10.

(7) Bulk corn grain of the private sector is projected in 6.3.5. According to the table, this is estimated to begin two years after the terminal silo starts to operate. The amount will be 12,000 T in 1982, the beginning year, and is expected to increase by 5% per annum from that time onwards. The quantity classified by each year is shown at the last page of this Annex 6-10.

(8) NGA's monthly stock of corn in the grain terminal silo, for which storage is chargeable, is calculated as follows:

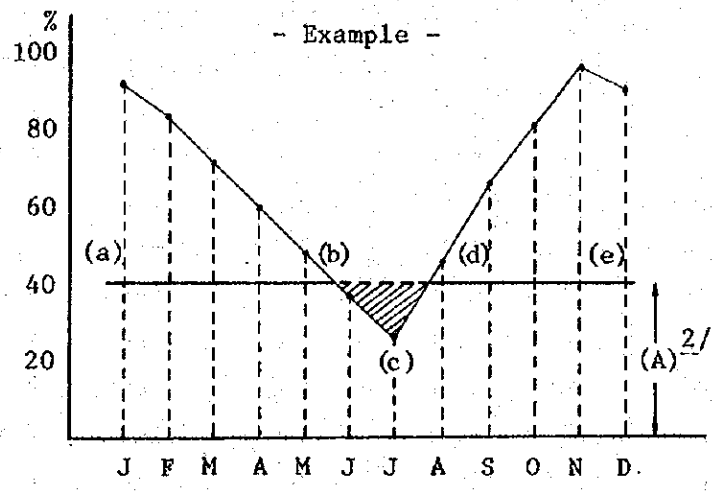
$$\text{(Silo capacity)} - \left(\begin{array}{l}\text{one-thirds of a month of commercial}\\ \text{corn handled in the terminal silo}\end{array}\right)^{1/} = \left(\begin{array}{l}\text{Silo space}\\ \text{for NGA}\end{array}\right) \text{T}$$

$$\text{(Silo space for NGA)} \div \left(\begin{array}{l}\text{Annual quantity of NGA}\\ \text{(corn handled in the terminal silo}\end{array}\right) \times 100 = \text{(A)}\,\%^{2/}$$

Monthly Stock of Inventory

(Annual volume handled taken as 100%

- Example -



1/ Refer to main report 6.4.1(3) necessity for keeping space for one-thirds of a month of total amount of commercial corn as temporary storing space.

2/ Silo capacity ratio to annual volume handled for NGA.

Due to its good performance against spoilage, let us assume that, NGA gives preference to this silo for storing corn grains. The NGA's monthly stock in the terminal silo (in percentage to total annual handling volume) is shown at (a)(b)(c)(d) and (e) in the chart. According to the example chart, there is extra space in the silo in June and July but it should be full up to (A) during the rest of the year. The aggregate annual stock in the silo, totaling each month's stock altogether, is shown at the flowing table of this annex.

Projected Corngrain for Corngrits at Cebu Terminal silo

	Inflow at Cebu Port (except for G.M.C. & Ludo)			Unloaded at the Grain Terminal			Aggregate Annual Stock of NGA Corn
	NGA	Comm'l	Total	NGA	Comm'l	Total	KT x month
1976	36.0	304.0	340.0				
7	36.5	308.2	344.7				
8	36.9	311.5	348.4				
9	37.4	315.8	353.2				
1980	37.8	319.1	356.9	34.0	0	34.0	118.3
1	38.5	325.1	363.6	34.7	0	34.7	118.4
2	39.2	311.0	370.2	35.3	12.0	47.3	114.9
3	39.9	336.9	376.8	35.9	12.6	48.5	114.9
4	40.6	342.8	383.4	36.5	13.2	49.7	114.8
5	41.2	347.8	389.0	37.1	13.9	51.0	114.7
6	41.8	352.9	394.7	37.6	14.6	52.2	114.6
7	42.3	357.1	399.4	38.1	15.3	53.4	114.5
8	42.9	362.2	405.1	38.6	16.0	54.6	114.4
9	43.4	366.4	409.8	39.1	16.9	56.0	114.3
1990	44.0	371.5	415.5	39.6	17.7	57.3	158.2
1	44.6	376.6	421.2	40.1	18.6	58.7	158.1
2	45.2	381.6	426.8	40.7	19.5	60.2	157.9
3	45.9	387.5	433.4	41.3	20.6	61.9	157.7
4	46.6	393.4	440.0	41.9	21.6	63.5	157.6
5	47.2	398.5	445.7	42.5	22.6	65.1	157.4

	Inflow at Cebu Port (except for G.M.C. & Ludo)			Unloaded at the Grain Terminal			Aggregate Annual Stock of NGA Corn
	NGA	Comm'l	Total	NGA	Comm'l	Total	KT x month
1996	47.8	403.6	451.4	43.0	23.8	66.8	157.1
7	48.3	407.8	456.1	43.5	24.9	68.4	156.9
8	48.9	412.9	461.8	44.0	26.2	70.2	156.6
9	49.4	417.3	466.7	44.5	27.5	72.0	156.4
2000	50.0	422.1	472.1	45.0	28.8	73.8	156.2
1	50.8	428.9	479.7	45.7	30.3	76.0	155.8
2	51.6	435.7	487.3	46.4	31.6	78.0	155.5
3	52.3	441.6	493.9	47.1	33.4	80.5	155.2
4	52.6	444.1	496.7	47.8	35.1	82.9	154.9
5	53.8	454.2	508.0	48.5	36.9	85.4	154.6
6	45.7	385.8	431.5	49.2	38.7	87.9	154.1
7	55.4	467.7	523.1	49.9	40.6	90.5	153.6

Model of Procurement/Inventory/Distribution of NGA Owned Corn at the Cebu Grain Terminal

The aim of NGA's intervention in corn transaction is to stabilize producer's price as well as consumer's price. For this reason NGA's corn procurement in the growing areas (mainly South Mindanao) is undertaken from August to November, which is the height of harvest time with price at the lower level.

The distribution of corngrits mainly takes place from March to June, during which corngrits usually command the highest price.

The past experience reveals a common trend in NGA's behaviour in distribution of rice as well as grits.
As far as grits is concerned, we can observe the following tendency when a year is divided into large distribution months and small distribution months. Assuming the total amount of annual distribution is 100%, the trend can be tabulated as follows.

	Season	Months	Quantity of distribution	Average quantity of distribution per month
Large distribution months of grits	March-June	4	55%	13.75%
Small distribution months of grits	July-February	8	45%	5.625%

Obviously, monthly quantity of distribution varies month by month. The amount of distribution reaches at its maximum somewhere in the middle of the large-distribution season exceeding the average level of the season. On the other hand, it reaches at its minimum somewhere in the middle of the small distribution season.

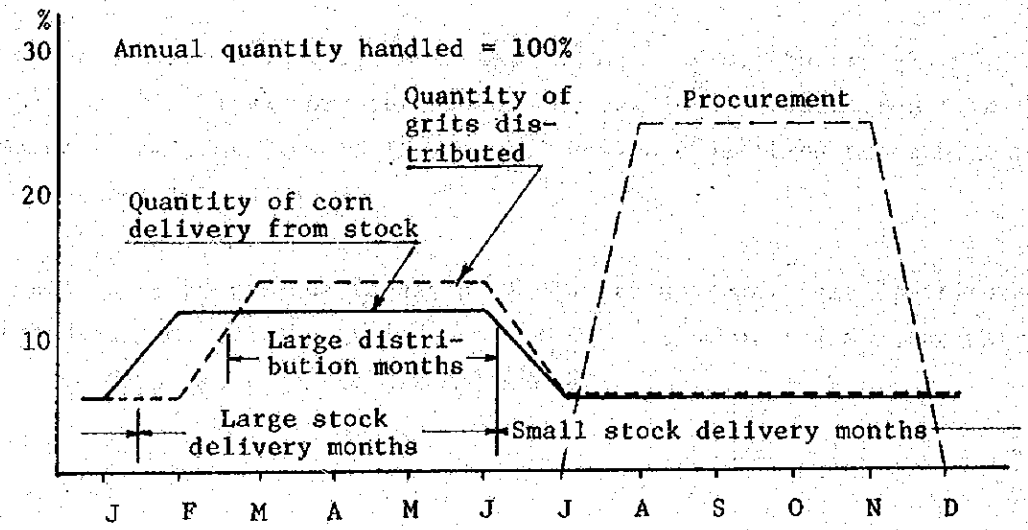
Presumably, one month in advance NGA starts letting out a sizable quantity of corn from storehouses for processing in preparation for the

large distribution season corngrits.

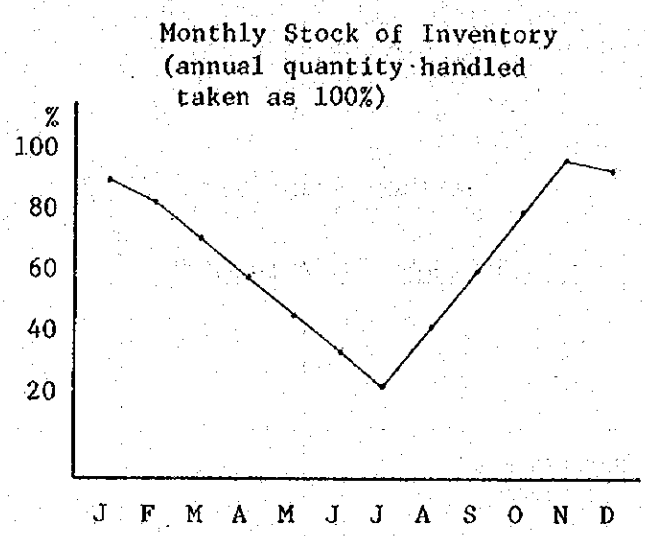
This delivery of stock will finish at the end of large distribution season.

	Season	Months	Delivery quantity	Average delivery quantity per month
Large delivery months of corn	February-June	5	60.6%	12.125%
Small delivery months of corn	July-January	7	39.4	5.625%

The trends can be illustrated as follows:



Assuming that NGA maintains minimum inventory level of two months' requirements of the large delivery season, the rate of amount stored by NGA should be 24.25% against 100 of annual quantity handled. (12.25 x 2 = 24.25)

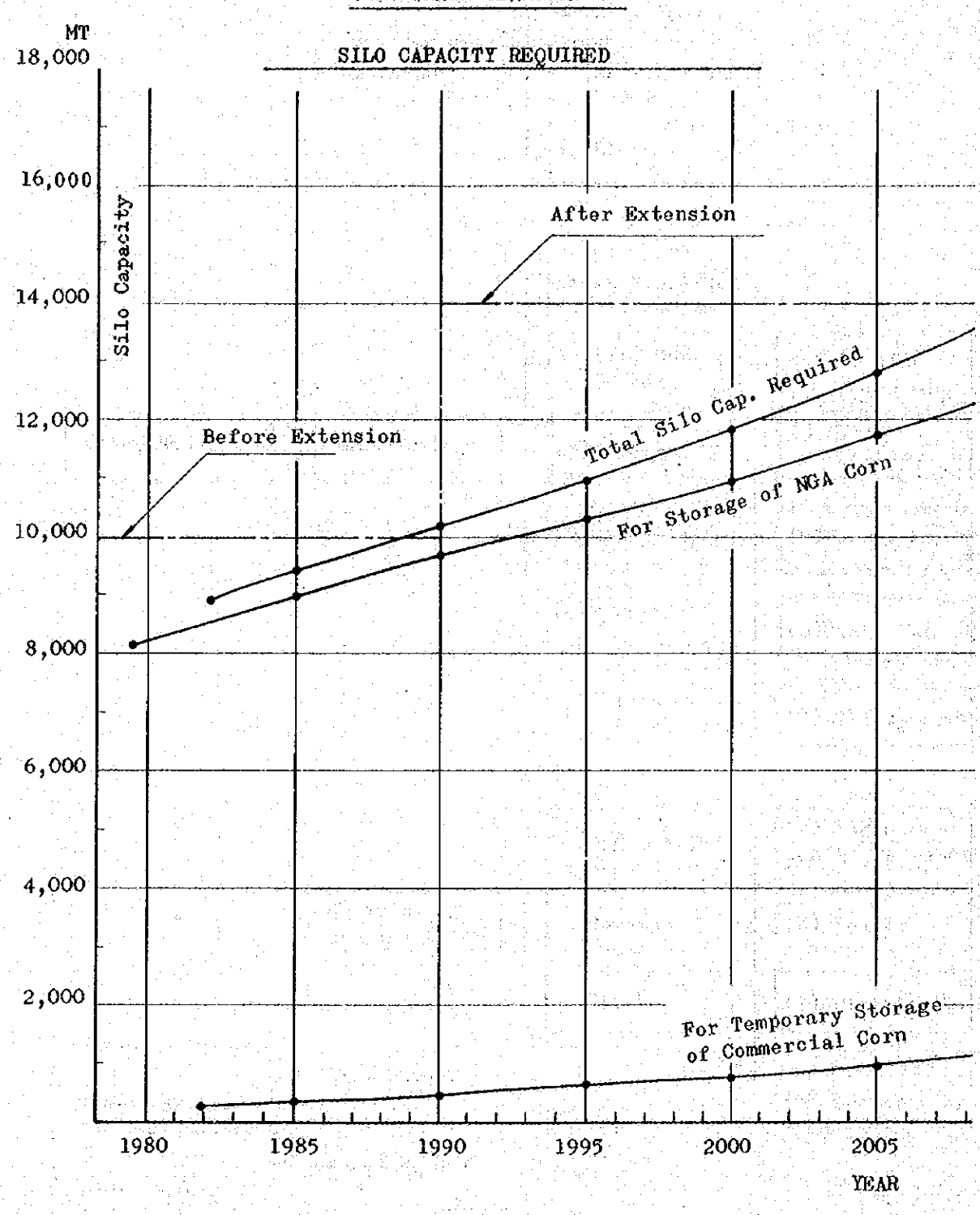


Once minimum inventory level and the name of months are given, monthly stock of inventory throughout the year can be estimated from the above mentioned quantity of inflow and outflow classified by each month. This is shown in the chart.

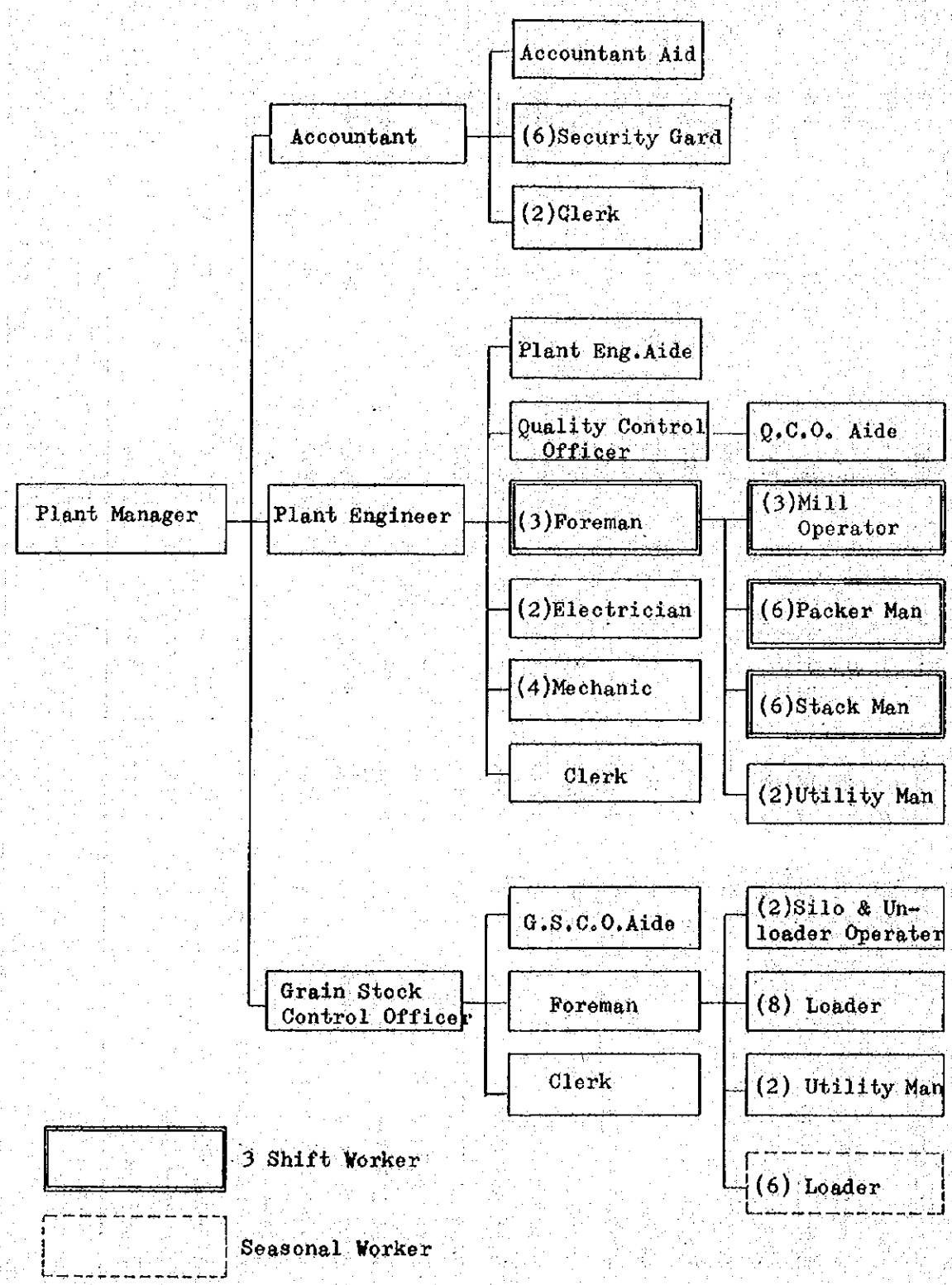
NGA is to keep these levels of inventory appropriately distributed at (1) Mindanao, (2) the grain terminal silo at Cebu, and (3) the warehouses in Cebu according to circumstances.

CEBU GRAIN TERMINAL

SILO CAPACITY REQUIRED



CEBU GRAIN TERMINAL ORGANIZATION CHART



Cebu GrainTerminal Schedule of Salaries, Wages & Allowances

Position	Qty.	Annual Salary	Living Allowance	Amelioration Representation & Transp. Allow	Medicare Retirement and Term Insurance	Overtime 10% of Salary	Total
Plant Manger	* 1	13,152	3,946	10,440	1,414	1,315	30,267
Accountant	* 1	7,992	2,400	1,200	924	799	13,315
Plant Engineer	o 1	11,904	3,571	1,200	1,296	1,190	19,161
Gain Stock Control Officer	x 1	6,552	2,400	1,200	763	655	11,570
Accounting Aide	* 1	4,188	-	600	57	419	5,264
Quality Control Officer	* 1	4,632	2,400	1,200	569	463	9,264
Mill Foreman	o 3	4,980	-	600	57	996	6,633
Plant Eng. Aide	o 1	4,188	-	600	57	419	5,264
Silo W. H. Foreman	x 1	4,980	-	600	57	498	6,135
Mill Operator	o 3	3,984	-	600	57	797	5,437
Packer Man	o 6	3,984	-	600	57	797	5,437
Stack Man	o 6	3,984	-	600	57	797	5,437
Security Gard	* 6	3,984	-	600	57	398	5,039
Clerk	* 6	3,984	-	600	57	398	5,039
Q.C.O. Aide	* 1	3,984	-	600	57	398	5,039
Electrician	* 2	3,984	-	600	57	398	5,039
Mechanic	x 4	3,984	-	600	57	398	5,039
G.S.C.O. Aide	x 2	3,984	-	600	57	398	5,039
Silo Unloader	x 2	3,984	-	600	57	398	5,039
Loader	x 8	3,984	-	600	57	398	5,039
Utility Man	* 4	3,432	-	600	57	943	4,432
Seasonal Worker	x 2.5	-	-	-	-	-	5,039

Tariffs for Cebu Grain Terminal

1. Basic elements

The charges at the grain terminal which constitute its primary revenue is as follows:

Handling charge	P18.0/T
Storage charge	P23.5/ T·month
Grit processing charge	P110/T

In deciding the charges, the grit processing charge is based on what is regarded as pertinent processing cost. The handling and storage charges are estimated on the basis of the following formula:

$$\text{(Relevant conventional charge)} + \left(\begin{matrix}\text{Merit derived from conversion} \\ \text{to bulk handling}\end{matrix}\right) \fallingdotseq \text{(the charge to be offered)}$$

The relevant conventional charges mean those for handling of goods in bag, warehousing and others. The merit derived from conversion to bulk handling is reduction of spoilage caused by insect, rodent damages, degeneration, spillage in handling and saving of bags, and transportation cost, and others.

2. Appropriation of merit derived from conversion to bulk handling

(1) Reduction in spoilage during storage

The merit of reduced spoilage is reflected only on the storing charge. As is indicated in the Annex 6-16, this material silo is expected to allow grain spoilage to be reduced by about 3.0 percent in comparison with the conventional warehouse storage.

(2) Reduction in spillage during handling

Grain handling in bulk is also expected to reduce about two percent of spillage through the course from a shipping silo to a corn mill (cf. Annex 6-16).

The merit equivalent to this two percent is to be distributed as follows: 0.3 percent to the shipping silo, 0.85 percent of the corn mill in Cebu and the balance 0.85 percent to thhs grain terminal. The said distribution ratio has been empirically formulated in accordance with the respective frequency of loading and unloading in the current distribution channel.

Although the merit of prevention of spillage, 0.85% of which is availed by the grain terminal, should be included in the handling charge in itself, the said merit will in actual practice be appropriated both to the handling charge and the storage charge, as an increased handling charge would inhibit of conversion of commercial corn to bulk handling.

(3) Reduction in cost of bag

Provided that a bag is used five times from a farmer to a corn mill and its wear and tear will be reduced by half by handling in bulk as use of the bag is limited to the course from the farmer to a shipping silo, this grain terminal is estimated to cut down cost of bags, per 50 kg as follows:

Bag price x 1/5 x 1/2

The merit from this cut-down is planned to go to the shipping silo by 20 percent, the corn mill by 40 percent and this grain terminal silo by the remaining 40 percent.

3. Decision of handling charge

(1) Conventional charges which will be replaced:

Stevedore	P5.50/T
Arrastre	5.60
Truck loading	1.40
Weighing	0.40
Total	P12.90/T ..... (A)

(2) Merit of handling in bulk

Reduction of spillage in handling 0.85%

With a price of corn at P1,120/T, the merit per metric ton of handling volume is calculated as follows:

P1,120/T x 0.0085 = P9.6/T ..... (B)

As the cost saving of bags is one tenth of new bag price as mentioned in the paragraph 2 (3) and the new bag price is P3.5/bag or P70 per metric ton of handling volume, a metric derived from this saving is:

P70/T x 1/10 = P7.0/T ..... (C)

The total of the above merits is:

(B) + (C) = 9.6 + 7.0 = P16.6/T,

which is distributed to as follows:

Addition to the handling charge ..... P5.1/T ..... (D)
Addition to the storage charge ..... P11.5/T ..... (E)

(4) Handling charges

The charges of (A) and (D) out of the above items from (A) to (E) are treated as the handling charge, the actual amount of which is P18.0/T as follows:

P12.9/T + P5.1/T = P18.0/T

4. Decision of storaging charge

(1) Conventional charges replaced

(a) Warehouse rent

Based on an average warehouse rent of NGA P5/M^2·month in Cebu and a capacity of 1.3 T/M^2, monthly rent per metric ton is as follows:

P5/M^2 ÷ 1.3 T/M^2 = P3.85/T·month ..... (F)

(b) Warehouse management fees

NGA in Cebu leases 11 warehouses capacitating 41 thousand tons with an average capacity of 3,700 T per warehouse.

Estimated costs of management for a warehouse are as follows:

Warehousemen: 3 warehouse staffs; 3 guards, total of 6 persons costing P30,000 annually based on an average annual wage of P5,000 per person.

Other expenses for the warehouse management cost the same amount as the above total wage bill.

Accordingly, the total warehouse managemnet cost is estimated to be P60,000 for a warehouse of such an average capacity of 3,700 T, which means P16.21 per annum for warehouse capacity of one metric ton.

In 1989, ten years after of the start of the grain terminal operation designed in this projection, the silo capacity for NGA corn will become 9,500 T (cf. Annex 6-12), the warehouse space rent corresponding to which is to be saved as follows:

$$9{,}500\ T \times P16.21/T \cdot year = P154{,}000/year$$

On the other hand, supposing that NGA corn to be aggregate annually stocked in the grain terminal is 114.3 KT x month (cf. Annex 6-10), the following amount is what can be passed on to the new storage charge of the grain terminal out of the conventional warehouse management fees:

$$P154{,}000/year \div 114{,}300\ T \cdot month/year = P1.35/T \cdot month \quad \ldots\ldots\ldots\ (G)$$

(c) Handling charges

The installation and operation of the grain terminal will allow savings to be effected on the cost of the conventional handling works (except unloading at the quay) as follows:

Transportation charges from
the wharf to NGA warehouse P5.40/T

Charges of receiving and delivery to and from NGA warehouses P2.80/T

Transportation charges from corn mill to the port

5.40 x 0.68 x 1/3 = P1.22/T

(Provided that one third of NGA grits is taken out of the island and that the milling recovery rate of grit processing is 0.68)

Total amount P9.42/T

Assuming that an annual handling volume of NGA corn will be 39,100 T/year and the aggregated volume to be stored at the silo is expected to be 114,000 T·month/year in 1989 as is the case with the foregoing paragraph (b), the amount that can be passed to the new storing charge of the grain terminal is as follows:

39,100 T/year x P9.42/T ÷ 114,300 T·month/year
= P3.22/T·month ..... (H)

(2) Appropriation of merit of handling in bulk

(a) Cut-down of spoilage

Providing that spoilage can be reduced by 3.0 percent with introduction of the grain terminal (cf. Annex 6-16), corn price is expected to be P1,120/T (cf. Annex 8-4) and an average stock period is assumed to be 3.0 months, so that what can be passed on to the storing charge as the merit of handling in bulk is as follows:

P1,120/T x 0.030 ÷ 3.0 month = P11.20/T·month... (I)

(b) Handling charges replaced

In order that handling of commercial corn in bulk should be actively promoted for the purpose of enforcing the revenues of this grain terminal, the handling charges should generally be kept at a appropriate levels to induce commercial grain traders.

Taking this into account, as is described in the foregoing paragraph 3 (2), the amount of P11.5/T marked (E) taken as one of the merits of handling in bulk will be charged as the storage charge even though it should be included in the handling charge. With the stock period fixed to be three months, the charge debited to the storage charges is:

P11.5/T ÷ 3.0 months = P3.83/T·month ..... (J)

(3) Storage charges

The storage charges consist of the aggregation of (F), (G), (H), (I) and (J), the amount of which is estimated to be P23.5/T·month as follows:

3.85 + 1.35 + 3.22 + 11.20 + 3.82 ≒ P23.25/T·month

5. Grits processing charge

The grits processing charge is based on what is regarded as appropriate processing cost as below. Each figure is calculated per year.

Depreciation of building	P2,714,000 ÷ 50 years	P52,000
Depreciation of machinery	P7,796,000 ÷ 20 years	390,000
Interest (2,714+7,796) ÷ 2 x 0.095		499,000
Personnel cost		180,000
Repair (1.9% of the cost of buildings and machinery)		199,000
Electricity		847,000
Fuel		282,000
Insurance		100,000
Miscellaneous		73,000
Total		P2,622,000

From this total cost of P2,622,000 for 24,000 metric tons processed annually, an average amount per metric ton is:

P2,622,000 ÷ 24,000 T = P110/T

The processing charge will be P110/T (calculated in terms of corn).

Reduction of Grain Loss in Handling and Storage

1) Most of losses in storage are caused by rodents, insects and microbes. Storing in silo is a very useful and effective countermeasure against them compared with storing in warehouse.
In regard to extermination of insects, a silo satisfies air tightness which is the most important requirement for fumigation. As for microbes, high temperature and humidity contribute to their propagation. There are almost no countermeasures against them in terms of bagged rice and corn in warehouses. However it is possible to cool and dry silo itself by way of sending cool air. This is very effective especially in hot and humid area such as Cebu.

In regard to rodents, in warehouses large scale extermination steps have to be undertaken in order to get efficient result, on the other hand, silos are able to protect grain from them by simply closing the entrances. Therefore, it is comparatively easy to take measures for lessening storage loss in silos.

According to the data at the end of Annex 6-16, the storage loss is estimated as 4% at least. Since grain shall be stored in the projected silo on an average 3 months out of 4 months storing term, the loss can be reduced to almost none. Consequently the rate of spoilage prevention by the silo is considered to be 4.0% x 3 months/ 4 months = 3.0%.

Besides the losses due to insects, rodents and deterioration in quality, there is spillage loss during transportation and handling, which amounts to 2-7% according to Gintong Built Oct. 1976.
Provided that the loss that occurs during transportation from producers to corngrits mill is estimated at 3.5%, this can be reduced down by 2% by handling corngrain in bulk of this project. This ratio of 2.0% against 3.5% is considered to be the ratio of handling times in bags which are reduced by this project, against handling times in bags which are required by conventional way from producer to corngrits mills and to the reduction of 2%, this terminal contribute by 0.85%.

2) Informations on grain losses in storage

Listed below are some reference materials on the above mentioned matter.

(A) Storage pest control program for FY 1975-76 (NGA)

(B) The state of post-production technology in the Philippines, A.S. Paras, Grains Journal Vol. 1 No. 2 (Aug. 1976)

(C) The RCA in the last eight months, J.D. Drilon, Jr.

Judging from (A), the loss by rodents is estimated at 2.5% and 10% by insects during storage term.

According to (B), the loss against total yearly production amount is computed at 10-37%, 2-6% of which is the loss during storage period.

Judging from (C), the aggregate loss from purchase to sale by RCA is averaged around 7.3% from 1968-70.

Expenditure of the Grain Terminal in Cebu

1. Construction cost

	Local currency (₱1,000)	Foreign currency (₱1,000)	Total (₱1,000)
Initial construction cost (1)+(2)+(3)	23,889	20,156	44,045
(1) Silo & silo tower	11,955	250	12,205
Mechanical & electrical equipment	2,390	9,948	12,338
Sub-total	14,345	10,198	24,543
(2) Corn mill building	1,161	53	1,214
Mechanical & electrical equipment	1,383	5,073	6,456
Sub-total	2,544	5,126	7,670
(3) Warehouse, office & others	2,207	0	2,207
Appurtenant facility, spare parts and sundry expenses	1,913	1,966	3,879
Contingency	2,101	1,729	3,830
Engineering consulting fee	778	1,137	1,915
Sub-total	6,999	4,832	11,831
Extension construction cost			
Silo & machine tower	3,673	0	3,673
Mechanical & electrical equipment in silo	218	417	635
Contingency, engineering consulting fee	590	146	736
Sub-total	4,481	563	5,044
Total	28,370	20,719	49,089

Annual spending of construction, as shown down below.

	Local currency (₱1,000)	Foreign currency (₱1,000)	Total (₱1,000)
Initial construction			
1978	15,028	317	15,345
1979	8,861	19,839	28,700
	23,889	20,156	44,045
Extension construction			
1978	1,636	45	1,681
1979	2,845	518	3,363
	4,481	563	5,044
Total	28,370	20,719	49,089

2. Personnel expense

Total number of personnel under and inclusive of the plant manager is estimated at 58. In addition, 6 persons will be temporarily hired for 5 consecutive months (Feb. - June, each year).

Breakdown of personnel their salaries (including allowances) by job classifications is as shown in Annex 6-13 and 6-14, respectively. Annual total personnel expense amounts to ₱373,089 and is estimated to remain constant after 1980. No personnel increase is planned for expected yearly increase in work volume, which will be offset by internal rationalization.

The work of scraping grain together into the nozzle of pneumatic unloader at the hold of the ship will be done by workers to be engaged in silo unloading work and will not be contracted to any considers.

Training cost estimated for 5-month's cost at initial operation is incorporated into the previous year's budget before commencement of operation.

3. Maintenance and replacement cost

Maintenance and replacement cost may be divided largely into the following two items:

(1) Repair and replacement on a large scale for the specific macine.

(2) Repair and replacement of fixed or consumable parts, and minor works to be made regularly.

(1) Repair and replacement on a large scale for specific equipment

Estimate is made as follows from technical aspect only. Total cost is summed up every five (5) years on the assumption that such need would not arise within 9 years from the initial operation date, because of brand-new equipment, but would arise in the 10th year and thereafter.

Silo division (x P1,000)

Equipment	Price for brand-new	1990	1995	2000	2005
Pneuma. unloader	5,325	213	533	270	2,663
Bucket elevator	861	148	172	861	0
Chain conveyer	441	22	44	441	0
Belt conveyer	145	7	7	7	145
Apex. separator	93	9	9	9	9
Hopper scale	206	21	21	21	206
Pulse air filter	135	13	13	13	135
Refrigerator	84	8	84	0	8
Heat exchanger	47	5	47	0	5
Total	7,337	446	931	1,622	3,170

Corn mill division (x P1,000)

Hopper scale	51	5	5	5	51
Grain separator	68	3	3	3	3
Degerminator	160	8	8	8	160
Pneuma. conveyer	583	14	18	29	14
Dust collector	438	12	22	22	438
Roller mill	446	12	22	139	20
Shifter	201	20	20	40	20
Table gravity sep.	167	4	4	4	4

Aspirator	178	5	5	5	5
Hammer mill	100	5	5	5	5
Sauring machine	114	5	5	5	5
Boiler	571	5	5	5	571
Total	3,077	98	122	266	1,296

(2) Regular repair, replacement and minor works

The cost will be less at the initial year (1980), but will continue to increase at a steady rate each year. The cost will then remain constant in the 11th year and thereafter. P289 thousand is estimated for the first year and P529 thousand from the 11th.

(3) Combined annual maintenance cost of (1) and (2) is estimated as indicated in the Table below.

Year	Specific Equipment	Regular	Total	Year	Specific Equipment	Regular	Total
1980		289	289	1994		529	529
81		310	310	95	1,053	529	1,582
82		329	329	96		529	529
83		349	349	97		529	529
84		371	371	98		529	529
85		393	393	99		529	529
86		412	412	2000	1,888	529	2,417
87		421	421	1		529	529
88		454	454	2		529	529
89		474	474	3		529	529
90	544	496	1,040	4		529	529
91		529	529	5	4,466	529	4,995
92		529	529	6		529	529
93		529	529	7		529	529
				Total	7,951	13,291	21,242

Total maintenance and replacement cost is smmed up to P21,242 thousand, averaged at P759 thousand each year. Annual maintenance cost is estimated at about 1.5% of total construction cost.

For maintenance of grain terminal, repair workers (electricians and mechanics) are employed a little more than is actually required in order to insure thorough maintenance.

4. Electricity cost

Electricity cost is estimated for the (1) silo division and (2) mill division. Cost to be incurred in the coordination divisions including office and others is shared in proportion to the ratio of consumption (1989).

(1) Silo division

Monthly charge is as follows:

Demand charge 308 kW x P12.5/kW = P3,850/mth
Energy charge rate P0.46058 per kWh

Calculation results on the basis of the 10th year operation:

245,000 kWh/month in energy requirement for 56,000 T/year of pneumatic unloading. Therefore, energy consumption per metric ton: 245,000 kWh/mth x 12 mth/year ÷ 56,000 M/year
= 5.26 kWh/T

Energy charge rate per metric ton:

5.26 kWh/T x P0.46/kWh = P2.42/T

Demand charge: P3,850 x 12 = P46,200/year

Therefore, electricity cost per each year is calculated as follows:

P46 thousand + annual unloading volume x P2.42/T

(2) Corn mill

Demand charge:

262 kW x P12.5/kW = P3,275/month (P39 thousand/year)

Energy charge: P0.46 per kWh, same as in the case of silo

Estimated monthly consumption:

146,400 kWh for corn processing of 2,000 T per month

Annual electricity cost, as follows:

P39 thousand/year + 146,400 kWh/month x P0.46/kWh x 12 months/year = P847 thousand/year

(3) Total electricity cost of (1) plus (2)

P893 thousand + annual unloading volume x P2.42

Annual unloading volume is referred to in Annex 6-10

5. Fuel cost

Steam extracted from the boiler will be utilized for drying in processing. Therefore, fuel cost is required in the boiler. It is estimated annually at P282 thousand from calculation of required heat calorie.

6. Insurance premium

1% premium will be paid of residual value assessed at the beginning of each year for invested capital. The premium rate above is an average fire insurance premium in the Philippines.

Calculating method for residual value is as follows:

Residual value at the beginning of year	−	Depreciation cost	+	Maintenance cost	=	Residual value as of the corresponding year-end

Residual value at the beginning of the initial year (1980) includes construction cost (P44,045 thousand). Extension investment scheduled fo for 1990 is also included in the residual year in the corresponding year.

Depreciation cost is estimated on the basis of fixed sum by dividing total construction cost with durable service years; 50 years for

building and 20 years for equipment.

Appurtenant cost, contingency, miscellaneous expenses and engineering consulting fee are divided between the building and equipment proportionately as may be deemed appropriate from each content.

	Building	Equipment	Others	Total
Construction cost (x 1,000)	P15,627	P18,794	P9,624	P44,045
Division in proportion (x 1,000)	P17,275	P26,770	-	P44,045
Durable years	50 years	20 years	-	
1980 - 1989 Annual depreciation (x 1,000)	P393/year	P1,218/year	-	P1,684/year
Extension construction cost (x 1,000)	P4,320	P742	-	P5,044
Depreciation for additional construction (x 1,000)	P86/year	P37/year	-	P123/year

Therefore, annual depreciation for 1980 - 1989 period is estimated at P1,684, and after 1990 is estimated at P1,807.

	Construction cost (x 1,000)	Residual V. at year beginning (x 1,000)	Depreciation (x 1,000)	Maintenance (x 1,000)	Residual V. at year end (x 1,000)
1980	P44,045	P44,045	P1,684	P289	P42,650
81		P44,650	P1,684	P310	P41,376
82		P41,376	P1,684	P329	P40,021
..... Omitted					
1989		P32,207	P1,684	P474	P30,997
90	P5,044	P36,041	P1,807	P1,040	P35,270
91		P35,270	P1,807	P529	P33,992
..... Omitted					

7. Miscellaneous expenses

Miscellaneous expenses are estimated at 5% of annual total cost including personnel, maintenance, power, fuel and insurance premium, based on the experiences in Japan.

Revenues and Expenditures for Alternaitve Plan in Cebu

1. Revenues

(1) Handling and storage charge

Estimate is made on the basis of 10,000 T storage capacity, 3 months storage period at average and 40,000 T annual handling volume. Revenue for new facility will be receivable from NGA as storage charge equal to the cost incurred other than by the conventional method.

The conventional method is to have a warehouse on rental basis apart from the port and to store NGA's grain in it. And the cost incurred by the existing methods are as follows: (See Annex 6-15.)

(a) Rental charge

$P6/M^2.mth \div 1.3\ T/M^2 \times 12\ mth/Y \times 10,000\ T = P554$ thousand/Y

Rental unit price: $P6/M^2.mth$
Accommodating capacity per M^2: $1.3\ T/M^2$

(b) Transportation charge from port to NGA's Warehouse

P5.40/T x 40,000 T/Y = P216 thousand/Y

(c) Charge for receiving and delivering

P2.80/T x 40,000 T/Y = P112 thousand/Y

(d) Maintenance & operation costs of warehouse

P1.3/T·mth x 12 mth/Y x 10,000 T = P156 thousand/Y

Annual revenue from the alternative plan is estimated at P1,038 thousand per year, which is the total sum of (a),(b),(c) and (d).

(2) Grits processing charge

As in the case of the original plan, annual revenue amounts to P2,640 thousand per year at unit charge of P110 per T for annual total

volume of 24,000 T.

Calculation basis, as shown in Annex 6-15.

2. Expenditures

(1) Construction cost (x1,000)

Warehouse (10,000 T ÷ 1.1 T/M^2 = 9,100 M^2) @₱900/M^2	₱8,190
Corn mill (same as original plan) including building and equipment	₱7,670
Office and related facilities (same as original plan)	₱11,831
Forklift scale and pallet, etc.	₱148
Total	₱28,789

(2) Personnel expense

The number of personnel is as indicated in organization chart of Annex 6-13, Workers in silo and warehouse are classified as follows:

GSOC	1 person	Annual ₱11,570
" aid	1	₱5,039
Foreman	1	₱6,135
F.L. driver	3	₱5,039
Loader	10	₱5,039
Utility man	2	₱4,432
Seasonally hired labour	2.5	₱5,039

The number of personnel in administrative, financial/accounting and engineering department, is the same as the original plan.

Total personnel expense: ₱397,069/year

(3) Maintenance and replacement costs

Besides maintenance and replacement costs for corn mill in original plan, those for the warehouse are estimated at 1.1% of construction cost per each year, which is the annual average over the 30-year period. Maintenance and replacement cost by year show in the attached cash flow table.

(4) Purchase cost for forklift

3 units of 2 ton forklifts will be required at each unit price of ₱100 thousand. Replacement will be made by new units in 7 durable years.

Price for trade-in is estimated at 10% of price for the new unit.

(5) Forklift maintenance, electricity and fuel costs

(unit: ₱1,000)

Forklift maintenance (35% of cost for new unit per annum including gas, parts and repair costs)	104/year
Electricity cost - same as the corn mill of the original plan	844/year
Fuel cost - same as the original plan	282/year
Total	1,230/year

(6) Insurance premium

Residual value at the beginning of year − Depreciation + Maintenance = Residual value at the corresponding year end

Premium: 1% of residual value at the beginning of year assessed, same as the case of original plan.

Depreciation cost is estimated on the fixed sum basis by dividing total construction cost with durable service years; 50 years for building and 20 years for equipment.

(7) Miscellaneous expenses

Miscellaneous expenses are estimated at 5% of annual total cost including personnel, purchase and maintenance of forklift, power, fuel and insurance premium but excluding construction cost.

3. Comparison with original plan

Cash flow total estimated for 30 years starting from 1978 is compared as below: (Unit: ₱1,000)

	Inflow total	Outflow total	In-out total
Original	199,204	130,745	68,459
Alternative	102,984	91,680	11,304

CEBU ALTERNATIVE FINANCIAL CASH FLOW

Unit: P 1,000

Year	Year in a Row	Inflow: Handling & Storage Charge	Inflow: Processing Charge	Inflow: Total	Outflow: Construction Cost	Outflow: Personnel Expend.	Outflow: Forklift	Outflow: Maintenance	Outflow: F.L. Mainte. Electricity Fuel	Outflow: Insurance	Outflow: Miscellaneous	Outflow: Total	Net Flow
1978	1				9,280							9,280	-9,280
9	2				18,559	159	300				23	19,041	-19,041
80	3	1,038	2,640	3,678	0	397	0	144	1,230	278	102	2,151	1,527
1	4	1,038	2,640	3,678	0	397	0	153	1,230	271	103	2,154	1,524
2	5	1,038	2,640	3,678	0	397	0	162	1,230	264	103	2,156	1,522
3	6	1,038	2,640	3,678	0	397	0	168	1,230	254	102	2,151	1,527
4	7	1,038	2,640	3,678	0	397	0	183	1,230	244	103	2,157	1,521
5	8	1,038	2,640	3,678	0	397	0	195	1,230	237	103	2,162	1,516
6	9	1,038	2,640	3,678	0	397	0	204	1,230	231	103	2,165	1,513
7	10	1,038	2,640	3,678	0	397	270	210	1,230	224	117	2,448	1,230
8	11	1,038	2,640	3,678	0	397	0	225	1,230	218	104	2,174	1,504
9	12	1,038	2,640	3,678	0	397	0	234	1,230	211	104	2,176	1,502
90	13	1,038	2,640	3,678	0	397	0	268	1,230	205	110	2,210	1,468
1	14	1,038	2,640	3,678	0	397	0	255	1,230	200	104	2,186	1,492
2	15	1,038	2,640	3,678	0	397	0	267	1,230	194	104	2,192	1,486
3	16	1,038	2,640	3,678	0	397	0	276	1,230	188	105	2,196	1,482
4	17	1,038	2,640	3,678	0	397	270	288	1,230	183	118	2,486	1,192
5	18	1,038	2,640	3,678	0	397	0	410	1,230	177	111	2,325	1,353
6	19	1,038	2,640	3,678	0	397	0	288	1,230	172	104	2,191	1,487
7	20	1,038	2,640	3,678	0	397	0	288	1,230	167	104	2,186	1,492
8	21	1,038	2,640	3,678	0	397	0	288	1,230	161	104	2,180	1,498
9	22	1,038	2,640	3,678	0	397	0	288	1,230	151	103	2,169	1,509
2000	23	1,038	2,640	3,678	0	397	0	557	1,230	150	130	2,464	1,264
1	24	1,038	2,640	3,678	0	397	270	288	1,230	147	103	2,437	1,783
2	25	1,038	2,640	3,678	0	397	0	288	1,230	141	103	2,159	1,519
3	26	1,038	2,640	3,678	0	397	0	288	1,230	135	103	2,153	1,525
4	27	1,038	2,640	3,678	0	397	0	288	1,230	130	102	2,147	1,531
5	28	1,038	2,640	3,678	0	397	0	1,578	1,230	124	166	3,495	183
6	29	1,038	2,640	3,678	0	397	0	288	1,230	131	102	2,148	1,530
7	30	1,038	2,640	3,678	0	397	0	288	1,230	126	102	2,143	1,535
		29,064	73,920	102,984	27,839	11,275	1,110	8,657	34,440	5,314	3,045	91,680	11,304

Subsoil Investigation and Evaluation at the Proposed Site in Cebu

I INTRODUCTION

This report has for its purpose to determine the engineering properties of the geologic formations underlying the site with the end in view of arriving at recommendations to guide foundation design and construction. To accomplish these purposes, the investigation work consisted of the following phases:

1) Subsurface investigation - drilling sample borings to determine soil stratigraphy and to obtain samples for laboratory testing.

2) Laboratory investigation - to verify field soil classifications.

3) Analysis and evaluation of test data.

Initial sections of this report contain a brief description of the field and laboratory phases of the study, description of the soil conditions, followed by recommendation for foundation design and construction. Pertinent design information and all data obtained during the field and laboratory phases of the study are appended in this report.

II FIELD INVESTIGATION

Information on soil condition at the site was obtained by drilling 2 boreholes driven up to about 50 meters depth. Descriptions of the soil profile encountered are given on boring logs presented in the appendix.

Samples of the foundation soils were obtained at every five (5) feet intervals and at intermediate points where a change in the soil condition was encountered employing the wash boring method of drilling. Disturbed samples were taken using a 2-inch O.D. standard splitspoon sampler in connection with the standard panetration test (SPT). The penetration number, N, in blows per foot and referred to as the driving resistance, reflects the relative density or consistency of the different materials encountered. Each sample was removed from the sampler in the field then was examined and classified by a soils engineer.

III LABORATORY INVESTIGATION

The laboratory testing program was directed primarily to verify the field soil classification.

Index properties of soil, such as natural water content, liquid and plastic limits, and grain size distribution were determined on each disturbed sample taken as a routine part of the classification tests. All test results are appended in this report.

IV SUBSURFACE CONDITION

Subsurface investigation indicated the underlying soil formation to be a mixture of sand, silt, clay and shell fragments. This subsoil is predominantly recent alluvial sediment of marine origin.

Referring to the field boring logs it can be seen that the materials encountered can be roughly classified into a relatively weak strata that generally have N (SPT) values of 10 or less, and relatively firm strata with N (SPT) values from 30 to over 100.

The upper layer of soft silty to sandy clay which consists the weak strata, is predominantly of marine origin with an aggregate thickness of about 10 meters. This formation is assumed to be made up mostly of dredged materials taken from the adjacent harbor as shown by the appearance of marine shells to fill up the reclaimed area in question. Below this is the firm strata which are composed of interbedding very stiff to hard sandy, silty clay and dense to very dense silty sand with gravel of brown, grayish brown to yellowish-brown in color up to the limit of the boring.

V WATER LEVEL

Sea water level was found to be about 3.0 meters below from the ground surface. The water table at TBH-1 was measured at 1.0 meter below the collar of hole after 1.0 hour of operation. Water table depends on tidal fluctuations.

VI FOUNDATION ANALYSIS

A. General Conditions:

The foundation of each structure must satisfy two (2) basic and independent criteria. First, the bearing pressure transmitted to the foundation soil must not exceed the ultimate bearing capacity of the soil reduced by an adequate factor of safety. Second, settlements due to consolidation of the clays must be within tolerable limits.

The types of foundation that can be used in the detailed foundation design are:

1) Shallow Foundations
   - Spread Foundation
   - Mat (raft) Foundation

2) Deep Foundations
   - Pile Foundation
   - Caissons

B. Shallow Foundations:

Spead foundations are used where the soil is sound and has good bearing capacity and where the settlements are expected to be small so as to be insignificant. Mat (raft) foundation is used to spread the load over as wide area as possible, and to give a measure of the rigidity to the substructure to enable it to bridge over local areas of weaker or more compressible soil. The degree of rigidity given to the mat also reduces probable differential settlements where there is wide variation in loading between adjacent columns or other applied loads.

1) Spread Foundation

a. Bearing Capacity

Bearing capacity of soil at a given depth depends primarily on the soil properties such as unit weight, shear strength, internal friction and degree of saturation.

This is also influenced by the dimensions of the bearing element of the foundation, surcharge due to overlying layers and elevation of the groundwater.

Light structures can be supported on shallow foundations placed on natural soil and embedded at least 1 meter below the ground surface.

For the site in question, the bearing capacity was determined using Terzaghi's Equation for a shallow foundation.

Results of the analysis using the strength and settlement criteria are tabulated in Table 1 below.

Table 1 Net Ultimate Bearing Capacity, KSF*

Founding Depth, D (M)	Minimum Footing Width B, (M) 1.5	3.0	4.5	6.0
1.5	1.85	1.77	1.74	1.69
3.0	2.01	1.85	1.80	1.77
4.5	2.14	1.96	1.85	1.80
6.0	2.22	2.01	1.93	1.85
7.5	2.28	2.09	1.96	1.90
9.0	16.32	15.00	14.07	13.69
10.5	16.41	15.57	14.44	13.88
12.0	24.76	23.36	22.23	21.10
13.5	25.04	23.64	22.51	21.67
15.0	36.18	34.17	32.96	31.36
16.5	49.45	47.25	45.60	43.40
18.0	49.45	47.80	45.60	43.95

* A factor of safety of 3 is recommended to determine the allowable soil pressure.

Bearing capacity values are tabulated in the manner shown above so that the foundation designer may be allowed an alternate precedure in his design. He may either locate the necessary depth of footings of predetermined sizes with the calculated bearing pressures, or to calculate the sizes of the footings at a desired level by using the corresponding value thereto.

b. Settlements

For footings founded within the upper 10 meters, excessive settlements are anticipated due to large deposits of soft silty clay that are highly compressible and that the foundation design must be such that settlements are prevented or within tolerable limits.

However, for founding level below 10 meters depth, values entered into Table 1, ensure safety against bearing pressure and at the same time limiting settlements to tolerable values. At these depths wherein a deposit of very stiff to hard silty clay is encountered, if the footings supporting a structure are designed for a factor of safety of 3, the differential settlements having their origin in compression of clay immediately beneath the deposit are not likely to exceed 0.75 inch, provided the footings are far apart that the action of each is independent of the others.

It should be noted that the estimated bearing capacity tabulated does not, however, take into account the differential settlement that may occur due to the different pressures induced by the footings which are set at different elevations. It is therefore necessary that the foundation be designed such that settlement shall be prevented or controlled within tolerable limits so as not to cause damage to the structure or equipment to be installed.

2) Raft Foundation

a. Bearing Capacity

The excess load on the base of a raft is computed in the same manner as that on the base of spread footing.

If the raft is located beneath a basement, it constitutes a large hollow footing with the basement walls. Hence, the allowable load (bearing capacity) on the base of the raft is equal to the allowable pressure in the subsoil plus the total effective weight of the soil replaced by the basement. The above statement indicates that the excess load on the base of a raft can be reduced by increasing the depth of the basement. In addition, bouyant force due to ground water also adds to the carrying capacity of the subsoil.

Results of the analysis are tabulated in Table 2 below. Due to large values of B for raft foundation and its subsequent little effect on the maximum settlement, the width can be disregarded in selecting the allowable soil pressure.

Table 2 Ultimate bearing Capacity for Raft Foundation

Founding Depth (M)	Ultimate Bearing Capacity, KSF*
1.5	2.00
3.0	2.53
4.5	3.00
6.0	3.53
7.5	4.00
9.0	13.70
10.5	14.20
12.0	20.00

A factor of safety of 3 for dead load and not more than 2 for dead load plus extreme combinations of live load are recommended to get the allowable soil pressure. It should be pointed out that the values in Table 2 are by no means net and it includes the dead weight of the materials the raft would be made of.

b. Settlement

The differential settlements of the area covered by the raft reflect in a general way the variations in the compressibility of the subsoil. However, because of the random distribution of compressible zones that may occur in the subsoil combined with the stiffening effect of the raft and building frame, it can be safely be assumed that the defferential settlement of a raft foundation per inch of maximum settlement is not more than one half the corresponding value for buildings on footings. Hence, if a defferential settlement of 0.75 inch can be tolerated, the allowable soil pressure can be so chosen that the maximum settlement is 2 inches instead of 1 inch as specified for spread footings.

c. Remarks

Assuming grain of 70 pcf and soil of 100 pcf, preliminary estimates of the depth of a fully compensated raft foundation is found to be about 20 meters, whereas a depth of about 10 meters is required to provide a safety factor of 3. The magnitude of these depths renders the use of raft foundation impractical in the view point of construction considering the high water table at the site and the subsequent heavy dewatering. Moreover, the use of this foundation scheme requires large excavation because of the problems as mentioned in item VII-2. In addition, heavy waterproofing will be required whenever basement floors are considered for grain storage.

C. Deep Foundations:

Piles or similar deep foundation scheme are used where the soil is soft and compressible, where large settlements are expected and where there is a possibility of scour.

1. Pile Foundation

The low strength and high compressibility of the upper 10 meters of soft silty clay materials on the site necessitates the use of piles or similar deep foundations scheme.

The nature of the soil encountered indicates that pile bearing capacity must be developed largely through end bearing on the hard strata.

Pile driving may be expected to be fairly easy up to a depth of 16 meters below the present ground surface. At greater depths, the firm strata may be reached and practical pile refusal will probably be attained.

The pile length will be dependent on the depth of the firm layer, where pile refusal will be encountered and this should be determined by test piling. The pile tip should be embedded and be well-seated on this firm stratum so as to properly carry the imposed load through end bearing.

2. Negative Skin Friction

Negative skin friction is a force developed through friction between the pile and the soil in a direction to increase the loading on the pile. Generally, the drag is downward because of the relative movement between the soil and the pile. This may occur when a pile is driven through a compressible soil so that the point is in firm material like what we have at the site. As the soil consolidates, the top layer moves downward.

This movement develops friction force on the perimeter of the pile which tends to carry the pile farther into the ground.

D. Recommendations

The pile bearing capacity must be developed largely through end bearing on the very dense sandy stratum, which has been referred to as firm strata.

Pile lengths will likely vary from 16 meters near the vicinity of TBH-2 to 17 meters near the vicinity of TBH-1.

1. Local Practice:

1. The piles generally used are prestressed concrete piles usually of the size - 0.35 M x 0.35 M (14" x 14").

2. Driving Methods - use of diesel powered double acting hammers, mostly the Delmag type D-22.

3. Founding Depths - piles are driven to refusal into the very dense gravelly silty sand.

4. Pile Capacity - the allowable actual structural capacity of the pile will govern the design, since the firm layer can carry the imposed load. However, the actual pile bearing capacity can be checked from the results of test piling using the dynamic formula. The usual design capacity (allowable) for a single 0.35 M x 0.35 M (14" x 14") prestressed concrete pile is taken as 90 tons.

VII OTHER REMARKS

1) Caissons

Caissons are used quite extensively for piers and abutments in rivers, lakes, and similar marine locations. They may also be used for waterfront structures such as docks, wharves or quays, seawalls, walls, etc. These structures provide a controlled work area for the placing of the foundation on the soil. Generally, caissons (other than drilled caissons) are restricted to major projects because of the cost.

Additionally, they are not generally competitive unless the firm soil stratum is more than 40 feet below the water surface since sheet pile cofferdam may be economically used to these depths.

Drilled caissons construction procedure is almost indentical to that of cast-in-place piles, that is, the shaft is drilled into the soil, which is then filled with concrete. The shaft may be cased with a metal shell to maintain the shaft before the concreting takes place and left as part of the member, or the shell may be gradually withdrawn as the shaft is filled with concrete. The bottom of the shaft may be undercut or pulled out, either be hand or machine, prior to concrete placement, to afford a larger end-bearing area. The drilled caisson is used at sites where the soil has low bearing capacity and it is necessary to transmit the loads to underlying firmer strata, and pile-driving vibrations are not allowed, pile members are too small for the load, or the larger end bearing area available with the caisson provides a larger load capacity.

Generally, however, the total skin friction along the shaft of a caisson is relatively small. Unlike the driven pile, a drilled caisson does not compact the sorrounding soil. Since a caisson usually rest on a hard stratum usually bedrock, that stratum practically takes all the load. Furthermore, the surface area available for skin friction on a caisson shaft is considerably smaller than the total surface area in a pile group. Consequently, the benefit of skin friction is neglected and the caisson is designed as a compression member subjected to load on top and an equal reaction at the bottom. In so doing caissons should generally rest on bedrock to be practical.

2) Excavations

Particular attention should be given to the following during excavation.

1. Support of excavation and protection of adjoining property.
2. Groundwater control.

Two main considerations govern the determination of stable slope for open excavations. The first of these as would be expected, is the type of soil, The second, the permissible degree of risk of slipping. For example, if important property is close to the top of an excavation, there must be no risk of a slip, and a high safety factor must be adopted.

The design of temporary supports to the sides of excavations is governed by the soil and ground water conditions, and by the depth and width of the excavated area.

Seepage forces due to water from a steeply cut face causes the material to flow outward from the toe at a very flat gradient. This is followed by slumping of the upper part and the whole face is progressively undermined.

The following solutions may be employed:

1) Close timbering (sheet pilings or runners)
2) Use of groundwater lowering system.

Continuous pumping from the surrounding ground may cause settlements of adjacent areas. Heavy inflow is liable to cause erosion or collapse of the sides of open excavations. Continuous support will have to be given to the face by means of close timbering (sheet pilings or runners). It is necessary to place the timbering in position as quickly as possible in order to avoid the slumping of the sides.

VIII CONCLUSIONS:

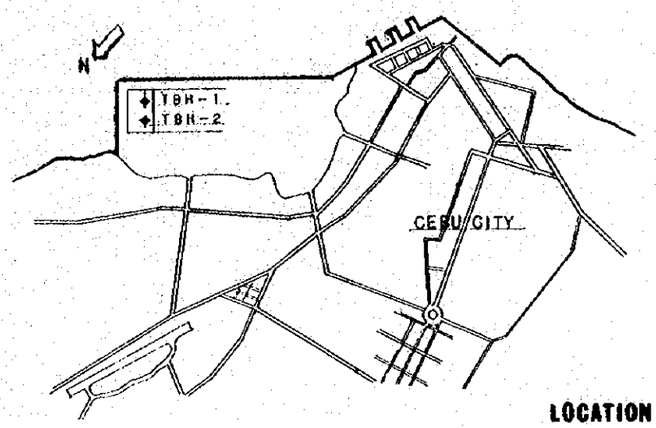
The behaviour of every foundation depends primarily on the engineering characteristics of the underlying soil deposits. Thus a knowledge of the different soil characters of the deposits, their principal constituents and physical properties are some of the prerequisites in any foundation design. These vital informations have been aimed at in this report.

Drawing No. SGC-B-001, which shows technical diagram has been prepared to determine the foundation pile design.

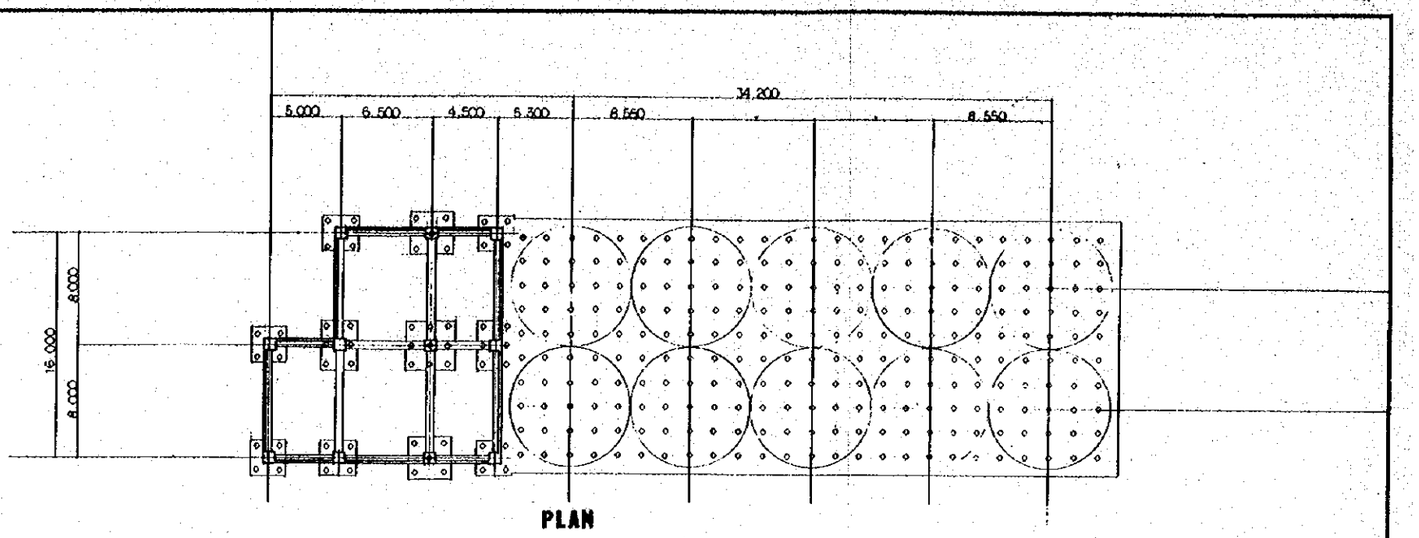
According to the data which we obtained from the penetration test, accomplished during the period from 14th November to 22nd December 1976, on the site of Cebu, we calculated the required length in meter of the pile to be the maximum safety.

This is adequate to support the structure and we consider that the cost is reasonable.

Full data and calculations are also included in the drawing.

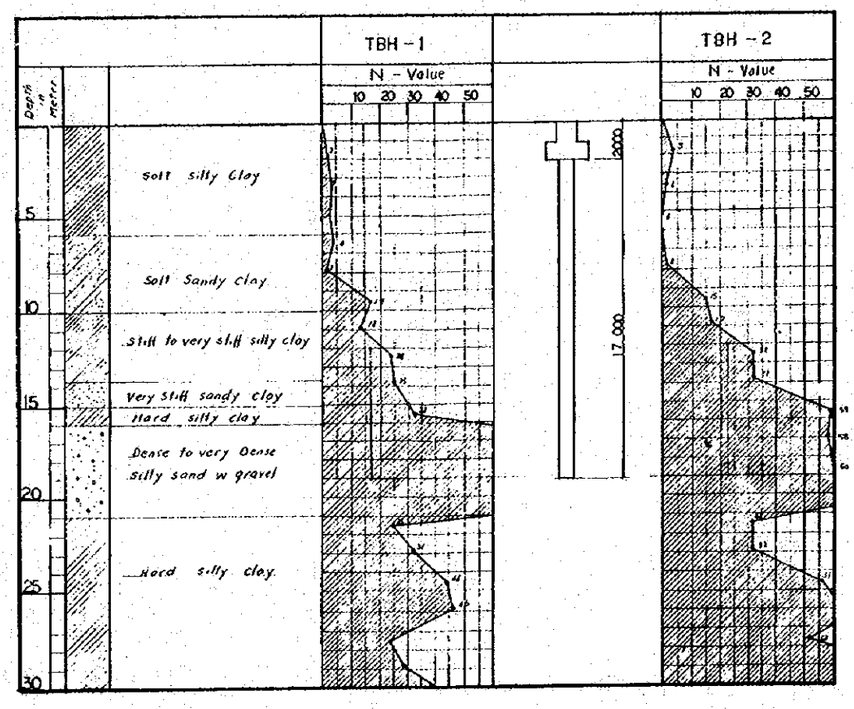


LOCATION



PLAN

0 10 20 25M



Ultimate Bearing power of Pile

$Ru = 30 \bar{N} Ap + (\frac{N_s}{5} Ls + \frac{qu}{3} Lc) \psi$

$\bar{N} = \frac{60 + 41 + 32}{3} = 44.3$

$Ap = 0.508^2 \times 0.785 = 0.2015$

$Ns = \frac{34 + 25 + 33 + 63 + 60}{5} = 43.0$

$\psi = 0.508 \times 3.14 = 1.595$

$qu \cdot Lc$: neglect

$Ru = 30 \times 44.3 \times 0.2015 + \frac{43.0}{5} \times 70 \times 1.595$

$= 267.12 + 81.28 = 350.8$

Allowable Bearing power of pile

$Ra = 1/3\ Ru = 1/3 \times 350.8 = 116.8$

Adopt $fp = 110$ T/pile

- Ru : Ultimate bearing capacity of Pile
- Ra : Allowable bearing capacity of Pile (Long time)
- Ap : Sectional area of pile head
- ψ : Perimeter of Pile
- Ns : The average of exact measurement of N-Value into sandy formation
- Ls : Length of pile in sandy formation
- Lc : Length of Pile in clayey formation
- qu : In part of penetrated pile under ground :- The [illegible] of unconfined compression strength in clayey formation

GRAIN TERMINAL CONSTRUCTION PROJECT PHILIPPINES		
CHECKED BY	DESIGNED BY	DRAWN BY
DATE 7. Mar. 1977		TITLE OF DRAWING CEBU EXPLANATORY DIAGRAM OF SOIL EXPLORATION
DRAWING NO. SGC-B-001		
JAPAN INTERNATIONAL COOPERATION AGENCY		

Facilities of
Cebu Grain Terminal

No.		Item	Specification	Quant.	Note
		Step I Construction			
A		Silo			
	I	Silo Tower	10 - Stories Total Floor Area of 1,680.48 m^2	L.S.	
	II	Silo Bins	Total Capacity of 12,276 T	L.S.	
	III	Shed on Silo Bins	Floor Area of 460.95 m^2	L.S.	
B		Corn Mill			
	I	Corn Mill	4 - Stories	L.S.	
	II	Storage Bin	100 T - Capacity/Each	2	
	III	Boiler Room		L.S.	
C		Other Buildings			
	I	Warehouse	Floor Area of 720 m^2	L.S.	
	II	Administration Building	Floor Area of 375 m^2	L.S.	
	III	Guard House	Floor Area of 16 m^2	L.S.	
	IV	Work Shop	Floor Area of 50 m^2	L.S.	

No.		Item	Specification	Quant.	Note
D		Mechanical Equipment of Silo			
I		Unloading Equipment			
	1	Pneumatic Unloader	150 T/H 2 Nozzles Fixed-Type	1	
II		Intake Equipment			
	1	Intake Chain Conveyor	165 T/H L=65m 22KW	1	
	2	Intake Bucket Elevator	165 T/H H=32m 30 KW	1	
	3	Rubble Separator	165 T/H 1.5 KW	1	
	4	Surge Bin Above Intake Hopper Scale	50 T - Capacity	1	
	5	Intake Hopper Scale	150 T/H 2 T/B	1	
	6	Hopper Under Intake Hopper Scale	3 T - Capacity	1	
	7	Bucket Elevator Above Silo Bin	165 T/H H=42 m 30 KW	1	
	8	Chain Conveyor on Silo Bins	165 T/H L=41.2 m 15 KW	1	Including 9 Slide Gates
	9	2 - Way Chute Valve on Silo Bins	165 T/H	5	
III		Discharging Equipment			
	1	Slide Gate Under Silo Bin	66 T/H Airtight Type	14	
	2	Chain Conveyor Under Silo Bins	66 T/H L=42 m 5.5 KW	2	
	3	Discharge Bucket Elevator	66 T/H L=30.5 m 15 KW 66 T/H L=35 m 15 KW	1 1	

No.		Item	Specification	Quant.	Note
	4	Surge Bin Above Discharge Hopper Scale	4.5 T - Capacity/Each	2	
	5	Discharge Hopper Scale	60 T/H 500 Kg/B	2	
	6	Hopper Under Discharge Hopper Scale	0.75 T - Capacity/Each	2	
	7	Distributor	66 T/H 4-Way 0.2 KW	2	
	8	Chain Conveyor to Mill No.1	66 T/H L=5.5 m 1.5 KW	1	
	9	Chain Conveyor to Mill No.2	66 T/H L=19.5 KW 3.7 KW	1	
	10	Bucket Elevator to Mill	66 T/H H=23 m 11 KW	1	
	11	2 - Way Chute Valve	66 T/H	1	
	12	Truckloading Chain Conveyor	66 T/H L=4.5 m 1.5 KW	1	
IV		Bagging Equipment			
	1	Surge Bin for Bagging	20 T - Capacity/Each	2	
	2	Belt Conveyor and Sewing Machine		2	
	3	Belt Conveyor No.1	L=18 m 2.2 KW	1	
	4	Belt Conveyor No.2	L=10 m H=2 m 2.2 KW Inclined Type	1	
V		Dust Collecting Equipment			
	1	Dust Collector and Fan for Intake Equipment	125 m^3/min 250 mmAq	1	
	2	Dust Collector and Fan for Discharging Equipment	45 m^3/min 250 mmAq	2	

No.		Item	Specification	Quant.	Note
	3	Dust Collector and Fan for Bagging	40 m^3/min 250 mmAq	1	
VI		Automatic Sampling Equipment			
	1	Automatic Sampler		1	
	2	Sample Divider		1	
VII		Test Equipment			
	1	Laboratory Grain Scale		1	
	2	Automatic Moisture Testor		1	
	3	Trip Balance Scale		1	
	4	Grain Sampler		1	
	5	Dockage Testor		1	
VIII		Others			
	1	Hoist	5 T	1	
	2	Compressor		L.S.	
	3	Refrigerating Unit		1	
	4	Heat Exchanger		1	
	5	Fan		1	
	6	Bridge Between Silo Tower and Warehouse		1	

No.		Item	Specification	Quant.	Note
E		Electrical Equipment of Silo			
	I	Metal Enclosed Switchgears	13.8 KV 3φ, 3W, 60 HZ	L.S.	
	II	Main Transformer	13.8 KV/440 V 3φ	1	
	III	Load Center	440 V	L.S.	
	IV	Lighting Transformer	440 V/220 V 1φ	1	
	V	Condenser	440 V 3φ	2	
	VI	Central Operation Panel	Desk Type	1	
	VII	Motor Control Center	Self-Standing Type	L.S.	
	VIII	Sequence Controller	Self-Standing Type	L.S.	
	IX	Local Switch Panels		L.S.	
	X	Grain Temperature Measuring Instruments		L.S.	Measuring 3 Points per Bin
		* Items I to V are common equipment to silo and corn mill			
F		Corn Mill			
	I	Cleaning Equipment			
	1	Hopper Scale	4 T/H 50 Kg/B	1	
	2	Grain Separator	7 T/H 1.5 KW	1	

No.		Item	Specification	Quant.	Note
	3	Tempering Bin		1	
	4	Steaming Conveyor		2	
	5	Magnet Separator	Spout Type	2	
	6	Degerminator	2 T/H 55 KW	2	
	7	Heating Conveyor		2	
	8	Pneumatic Conveyor		L.S.	
	9	Dust Collecting Equipment		L.S.	
II		Milling Equipment			
	1	Aspirator		9	
	2	Sifter	20 Steps x 6 3.7 KW	1	
	3	Table Gravity Separator	1.5 T/H 0.2 KW	2	
	4	Roller Mill		2	
	5	Heating Conveyor		1	
	6	Hammer Mill	1.5 T/H 37 KW	1	
	7	Pneumatic Conveyor		L.S.	
	8	Dust Collecting Equipment		L.S.	

No.			Item	Specification	Quant.	Note
	III		Bagging Equipment			
		1	Pneumatic Conveyor		L.S.	
		2	Surge Bin		7	
		3	Belt Conveyor and Sewing Machine		2	
	IV		Other			
		1	Boiler	2 T/H	1	
G			Electrical Equipment of Corn Mill			
	I		Central Operation Panel	Desk Type		
	II		Motor Control Center	Self-Standing Type 440 V	L.S.	
	III		Sequence Controller	Self-Standing Type	L.S.	
	IV		Local Switch Panels		L.S.	
H			Accessory Facilities			
	I		Fence, Gate, Parking		L.S.	
	II		Premises - Pavement		L.S.	
	III		Outdoor Lights		L.S.	
	IV		Water Supply, Drainage and Fire hydrant		L.S.	
	V		Internal Communication Equipment		L.S.	
	VI		Survice Wire-Equipment		L.S.	

No.	Item	Specification	Quant.	Note
VII	Diesel Generator and Peripheral Equipment		L.S.	
	Step II Construction			
A	Silo			
I	Silo Bins	Total Capacity of 5,000 T	L.S.	
II	Shed on Silo Bins	Floor Area of 179.55 m^2	L.S.	
B	Mechanical Equipment of Silo			
I	Intake Equipment			
1	Chain Conveyor on Silo Bins	165 T/H 22 KW	1	C.C. (Step I) Extended 18 m Including 4 Slide Gates
II	Discharging Equipment			
1	Slide Gate Under Silo Bin	66 T/H Airtight Type	6	
2	Chain Conveyor Under Silo Bins	66 T/H 11 KW	2	C.C. (Step I) Extended 18 m
C	Electrical Equipment of Silo			
I	Motor Control Center	Self-Standing Type 440 V	L.S.	
II	Local Switch Panels		L.S.	

No.	Item	Specification	Quant.	Note
III	Grain Temperature Measuring Instruments		L.S.	Measuring 3 Points per Bin
D	Accessory Facilities			
I	Outdoor Lights		L.S.	
II	Internal Communication Equipment		L.S.	

Remarks

L.S.	:	Lump Sum
T/H	:	Capacity of ----- Tons per Hour
L	:	Length
H	:	Height
T(Kg)/B	:	Tons (Kg) Per Batch
ϕ	:	Phase
W	:	Wire

Detailed Cost Estimate for Construction

Cebu Grain Terminal

No.	Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
	Step I Construction			
A	Silo			
I	Temporary Work	L.S.	958,000	
II	Earthworks	L.S.	218,000	
III	Foundation Construction Steel Pipe Pile ϕ=508mm L=17m	L.S. (305)	3,240,000	
IV	Building Frame Construction Concrete Reinforcement Concrete Form	L.S. (3650 m^3) (820 T) (29000 m^2)	4,109,000	
V	Finish Work	L.S.	3,025,000	
VI	Other Works	L.S.	50,000	
VII	Lighting, Outlet and Air-Conditioner	L.S.	180,000	
VIII	Passenger Elevator	1		250,000
IX	Lightning Rods	L.S.	50,000	
X	Foundation of Outdoor Chain Conveyor and Unloader	L.S.	125,000	
	Sub Total		11,955,000	250,000

No.	Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
B	Corn Mill			
I	Temporary Work	L.S.	93,000	
II	Earthworks	L.S.	50,000	
III	Foundation Construction Steel Pipe Pile ϕ=508mm L=17m	L.S. (24)	317,000	
IV	Building Frame Construction Concrete Reinforcement Concrete Form	L.S. (270 m^3) (30 T) (2900 m^2)	320,000	
V	Finish Work	L.S.	170,000	
VI	Other Works	L.S.	38,000	
VII	Boiler Room	L.S.	45,000	6,000
VIII	Storage Bin	L.S.	54,000	47,000
IX	Others	L.S.	74,000	
	Sub Total		1,161,000	53,000
C	Other Buildings			
I	Warehouse	L.S.	1,084,000	
II	Administration Building	L.S.	1,007,000	
III	Guard House	L.S.	34,000	

No.		Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
IV		Work Shop	L.S.	83,000	
		Sub Total		2,208,000	
D		Mechanical Equipment of Silo			
I		Unloading Equipment			
	1	Pneumatic Unloader	1	575,000	4,750,000
II		Intake Equipment			
	1	Intake Chain Conveyor	1	44,000	210,000
	2	Intake Bucket Elevator	1		240,000
	3	Rubble Separator	1		93,000
	4	Surge Bin above Intake Hopper Scale	1	18,000	16,000
	5	Intake Hopper Scale	1		88,000
	6	Hopper under Intake Hopper Scale	1	4,000	3,000
	7	Bucket Elevator above Silo Bin	1		269,000
	8	Chain Conveyor on Silo Bins (Including Chute, Slidegate ane Stand on Silo Bins)	1	29,000	181,000
	9	Two-way Chute Valve on Silo Bins	5		22,000
	10	Accessory of Silo Bin	L.S.	13,000	137,000

No.		Item	Quant	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
III		Discharging Equipment			
	1	Slide Gate under Silo Bin	14		85,000
	2	Chain Conveyor under Silo Bins (Including Chute under Silo Bins)	2	11,000	137,000
	3	Discharge Bucket Elevator	2		327,000
	4	Surge Bin above Discharge Hopper Scale	2	10,000	7,000
	5	Discharge Hopper Scale	2		118,000
	6	Hopper under Discharge Hopper Scale	2	3,000	3,000
	7	Distributor	2		73,000
	8	Chain Conveyor to Mill No.1	1		24,000
	9	Chain Conveyor to Mill No.2	1		36,000
	10	Bucket Elevator to Mill	1		131,000
	11	Two-way Chute Valve	1		4,000
	12	Truckloading Chain Conveyor	1		20,000
IV		Bagging Equipment			
	1	Surge Bin for Bagging	2	21,000	18,000
	2	Belt Conveyor and Sewing Machine	2		94,000
	3	Belt Conveyor No.1	1		36,000

No.		Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
	4	Belt Conveyor No.2	1		20,000
V		Dust Collecting Equipment			
	1	Dust Collector and Fan for Intake Equipment	1		79,000
	2	Dust Collector and Fan for Discharging Equipment	2		108,000
	3	Dust Collector and Fan for Bagging	1		52,000
	4	Dust Collecting Duct	L.S.	66,000	106,000
VI		Automatic Sampling Equipment			
	1	Automatic Sampler	1		18,000
	2	Sample Divider	1		18,000
VII		Test Equipment			
	1	Test Equipment	L.S.		77,000
VIII		Others			
	1	Hoist	1		111,000
	2	Compressor	L.S.		28,000
	3	Air-piping	L.S.	19,000	30,000
	4	Bridge Between Silo Tower and Warehouse	1	11,000	15,000
	5	Cooling and Aerating Equipment	L.S.	10,000	172,000

No.		I t e m	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
	6	Stand and Chute in Silo Tower	L.S.	70,000	38,000
	7	Other Accessory Equipment	L.S.		25,000
	8	Erection	L.S.	488,000	
	9	Painting at Site	L.S.	75,000	
		Sub Total		1,467,000	8,019,000
E		Electricl Equipment of Silo			
	I	Metal Enclosed Switchgears	L.S.		300,000
	II	Main Transformer	1		72,000
	III	Load Center	L.S.		321,000
	IV	Lighting Transformer	1		9,000
	V	Condenser	2		20,000
	VI	Central Operation Panel	1		195,000
	VII	Motor Control Center	L.S.		343,000
	VIII	Sequence Controller	L.S.		273,000
	IX	Local Switch Panels	L.S.		158,000
	X	Grain Temperature Measuring Instruments	L,S.		238,000
	XI	Wiring	L.S.	923,000	
		Sub Total		923,000	1,929,000

No.		Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
F		Mechanical Equipment of Corn Mill			
	I	Cleaning Equipment			
	1	Hopper Scale	1		51,000
	2	Grain Separator	1		68,000
	3	Degerminator	2		160,000
	4	Pneumatic Conveyor	L.S.	34,000	172,000
	5	Dust Collecting Equipment	L.S.	11,000	74,000
	6	Other Equipment	L.S.	9,000	255,000
	II	Milling Equipment			
	1	Roller Mill	2		440,000
	2	Sifter	1		201,000
	3	Table Gravity Separator	2		167,000
	4	Aspirator	9		178,000
	5	Hammer Mill	1		100,000
	6	Pneumatic Conveyor	L.S.	29,000	276,000
	7	Dust Collecting Equipment	L.S.	52,000	361,000
	8	Other Equipment	L.S.		68,000

No.		Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
III		Bagging Equipment			
	1	Pneumatic Conveyor	L.S.	9,000	134,000
	2	Belt Conveyor and Sewing Machine	2		94,000
	3	Ohter Equipment	L.S.	58,000	169,000
IV		Others			
	1	Boiler	1		570,000
	2	Erection	L.S.	528,000	28,000
		Sub Total		730,000	3,566,000
G		Electrical Equipment of Corn Mill			
I		Metal Enclosed Switchgears	L.S.		271,000
II		Main Transformer	1		66,000
III		Load Center	L.S.		285,000
IV		Lighting Transformer	1		9,000
V		Condenser	2		19,000
VI		Central Operation Panel	1		220,000
VII		Motor Control Center	L.S.		275,000
VIII		Sequence Controller	L.S.		294,000

No.	Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
IX	Local Switch Panels	L.S.		68,000
X	Wiring	L.S.	653,000	
	Sub Total		653,000	1,507,000
H	Accessory Facilities	L.S.	1,833,000	108,000
I	Spare Parts	L.S.		400,000
J	Design and Supervision Services	L.S.	80,000	1,458,000
	Total of Items A to J		21,010,000	17,290,000
K	Contingency (10% of A-J Total)	L.S.	2,101,000	1,729,000
L	Engineering Consulting Fee	L.S.	778,000	1,137,000
	Total of Items A to L		23,111,000	19,019,000
	Grand Total (L.C + F.C.)			44,045,000

No.		Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
		Step II Construction			
A		Silo			
	I	Temporary Work	L.S.	303,000	
	II	Earthworks	L.S.	75,000	
	III	Foundation Construction Steel Pipe Pile ϕ=508mm L=17m	L.S. (100)	1,063,000	
	IV	Building Frame Construction	L.S.	1,324,000	
		Concrete	(1120 m^3)		
		Reinforcement	(272 T)		
		Concrete Form	(7550 m^2)		
	V	Finish Work	L.S.	837,000	
	VI	Other Works	L.S.	38,000	
	VII	Lighting and Outlet	L.S.	20,000	
	VIII	Lightning Rods	L.S.	13,000	
		Sub Total		3,673,000	
B		Mechanical Equipment of Silo			
	I	Intake Equipment			
	1	Chain Conveyor on Silo Bins (Including Chute Slide Gate and Stand on Silo Bins)	1	12,000	80,000

No.		Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
	2	Two-way Chute Valve on Silo Bins	2		9,000
	3	Accessory of Silo Bin	L.S.	5,000	57,000
II		Discharging Equipment			
	1	Slide Gate under Silo Bin	6		36,000
	2	Chain Conveyor under Silo Bins (Including Chute under Silo Bins	2	5,000	56,000
III		Others			
	1	Cooling and Aerating Equipment	L.S.	4,000	12,000
	2	Erection	L.S.	56,000	
	3	Painting at Site	L.S.	11,000	
		Sub Total		93,000	250,000
C		Electrical Equipment of Silo			
	1	Motor Control Center	L.S.		63,000
	2	Local Switch Panels	L.S.		8,000
	3	Grain Temperature Measuring Instruments	L.S.		30,000
	4	Remodeling	L.S.		66,000
	5	Wiring	L.S.	125,000	
		Sub Total		125,000	167,000

No.	Item	Quant.	Total Cost (₱) Local Currency (₱)	Foreign Currency (₱)
D	Accessory Facilities	L.S.	15,000	
E	Design and Supervision Services	L.S.		63,000
	Total of Items A to E		3,906,000	480,000
F	Contingency (10% of A-E Total)	L.S.	391,000	48,000
G	Engineering Consulting Fee	L.S.	184,000	35,000
	Total of Items A to G		4,481,000	563,000
	Grand Total (L.C. + F.C.)		5,044,000	

Remarks

L.C. : Local Currency
F.C. : Foreign Currency
ϕ : Diameter
L : Length

ANNEX 7-2, Items E-I to V are common equipment to silo and corn mill, so we divided the cost of the above equipment into Items E-I to V and G-I to V in accordance with the reasonable proportion.

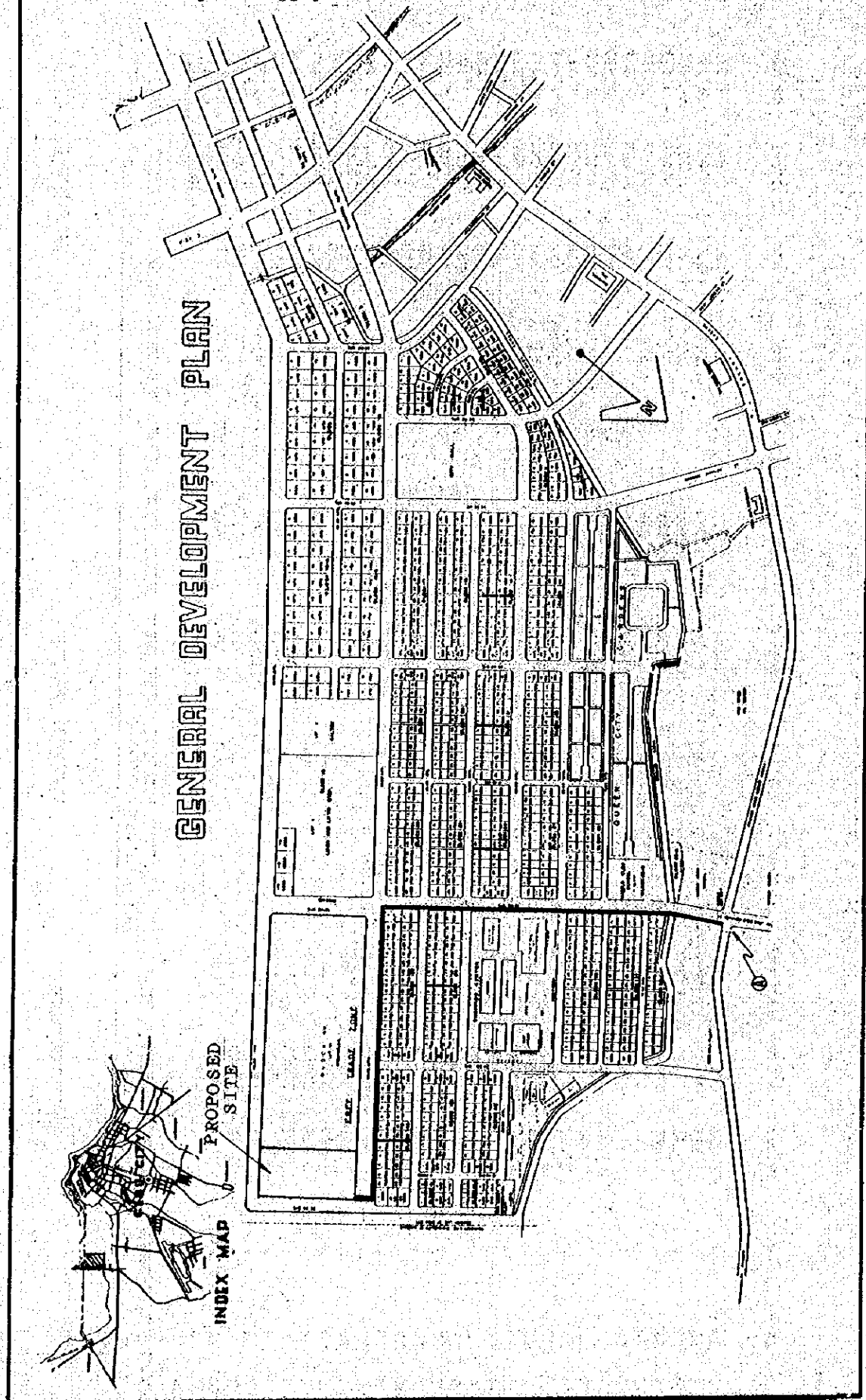
ANNEX 7-4

Standard Illuminance of Cebu Grain Terminal

The standard illuminance of the indoor and outdoor illuminations shall be as follows.

Control room:	300 to 400 lux
Machine room and similar places:	200 "
Office and similar places:	300 to 450 "
Electric room:	200 to 300 "
Surroundings of machine:	200 "
Overhead bridge and similar places:	50 "
Operation span at night:	50 "
Wharf:	50 "
Access road and premises:	10 "

Map of Supply Power Cable, Cebu Grain Terminal



Cebu Grain Terminal

FINANCIAL CASH FLOW

Unit: ₱ 1,000

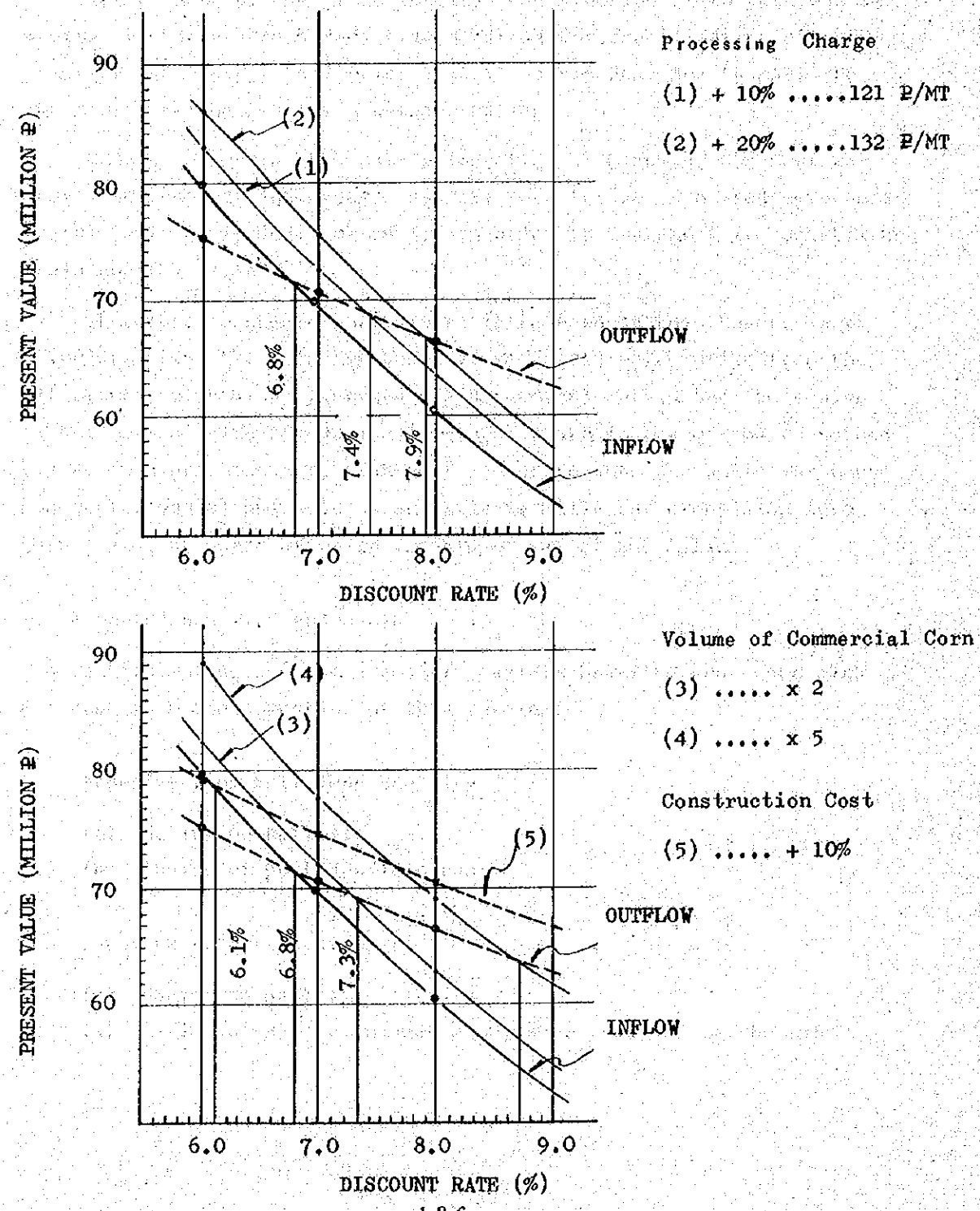
Year	Year in a Row	Inflow: Processing Charge	Inflow: Handling Charge	Inflow: Storage Charge	Inflow: Total	Outflow: Construction Cost	Outflow: Personnel Expense	Outflow: Maintenance	Outflow: Electricity	Outflow: Fuel	Outflow: Insurance	Outflow: Miscellaneous	Outflow: Total	Net flow (In-Out)
1978	1					15,345							15,345	△15,345
9	2					28,700	149					88	28,857	△28,857
80	3	2,640	612	2,780	6,032		373	289	975	282	440	118	2,477	3,555
1	4	"	625	2,782	6,047		"	310	977	"	427	118	2,489	3,560
2	5	"	851	2,700	6,191		"	329	1,007	"	414	120	2,525	3,666
3	6	"	873	2,700	6,213		"	349	1,010	"	401	121	2,536	3,677
4	7	"	895	2,697	6,232		"	371	1,013	"	388	121	2,548	3,684
5	8	"	918	2,695	6,253		"	393	1,016	"	376	122	2,562	3,691
6	9	"	940	2,693	6,273		"	412	1,019	"	364	122	2,572	3,701
7	10	"	961	2,690	6,291		"	421	1,022	"	352	122	2,572	3,719
8	11	"	983	2,688	6,311	1,681	"	454	1,025	"	333	123	4,271	2,040
9	12	"	1,008	2,686	6,344	3,364	"	474	1,029	"	322	124	5,968	376
90	13	"	1,031	3,718	7,389		"	1,040	1,032	"	360	160	3,247	4,142
1	14	"	1,057	3,715	7,412		"	529	1,035	"	355	128	2,702	4,710
2	15	"	1,084	3,711	7,435		"	529	1,039	"	342	128	2,693	4,742
3	16	"	1,114	3,706	7,460		"	529	1,043	"	320	129	2,676	4,784
4	17	"	1,143	3,704	7,487		"	529	1,047	"	301	130	2,662	4,825
5	18	"	1,172	3,699	7,511		"	1,582	1,051	"	290	182	3,760	3,751
6	19	"	1,202	3,692	7,534		"	529	1,055	"	287	130	2,656	4,878
7	20	"	1,231	3,687	7,558		"	529	1,059	"	275	129	2,647	4,911
8	21	"	1,264	3,680	7,584		"	529	1,063	"	264	128	2,639	4,945
9	22	"	1,296	3,675	7,611		"	529	1,067	"	253	128	2,632	4,979
2000	23	"	1,328	3,671	7,639		"	2,417	1,072	"	241	222	4,607	3,032
1	24	"	1,368	3,661	7,669		"	529	1,077	"	249	129	2,639	5,030
2	25	"	1,404	3,654	7,698		"	529	1,082	"	237	129	2,632	5,066
3	26	"	1,449	3,647	7,736		"	529	1,088	"	226	128	2,626	5,110
4	27	"	1,492	3,640	7,772		"	529	1,094	"	214	127	2,619	5,153
5	28	"	1,537	3,633	7,810		"	4,995	1,100	"	202	351	7,303	507
6	29	"	1,582	3,621	7,843		"	529	1,105	"	236	130	2,655	5,188
7	30	"	1,629	3,610	7,879		"	529	1,112	"	214	130	2,640	5,239
	Total	73,920	32,049	93,235	199,204	49,090	10,593	21,242	29,314	7,896	8,683	3,937	130,745	68,459

ANNEX 8-1 (1/1)

CEBU GRAIN TERMINAL

PRESENT VALUE INFOR-OUTFLOW CURVE

(FINANCIAL)



Assumption of Economic Analysis of the Grain Terminal in Cebu

1. Background for analysis

The purpose of the grain terminal construction is to rationalize storage of buffer stock and cargo handling for stabilization of the existing grain supply and price system through NGA, and to meet the increasing demand for grain cargo handling.

Unless the grain terminal is installed as planned, NGA must endeavor to continue and expand capacity for storage of bagged corn on a rental basis as is done currently, in order to implement its established grain control policy.

Therefore, economic analysis as introduced in this Report is to calculate from the expected benefits and costs which arise from the difference between the proposed grain terminal method and the conventional method. The conventional method, which is the method to unload bagged corn at the wharf, transport and store into the NGA's warehouse (on rental basis) and subcontract private mills for processing into corn grits, and part of which is shipped out of the island.

2. Expected benefits and costs

The following are the items of possible benefits and costs with expected from the operation of this terminal.

(1) Benefits from bulk load handling

(a) Saving on spillage
(b) Saving of port handling cost

(2) Beneifts from silo storage

(c) Saving on spoilage
(d) Saving of operation and maintenance costs of warehouses

(3) Benefits from grain terminal construction in port area

(e) Saving of land transportation cost

(4) Benefits from corn milling plant as part of grain terminal complex

(f) Saving of transportation cost by interconnection between silo and corn mill

(g) Increase in value added derived from corn milling

(5) Benefits from other factors

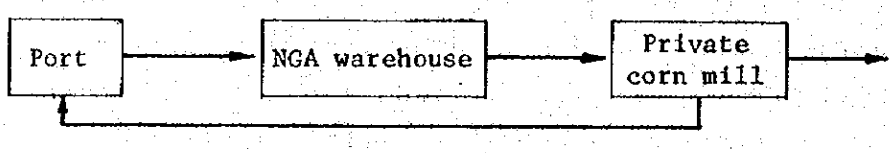
(h) Mitigation of freight loss and saving of handling cost due to improved storage system

(6) Costs

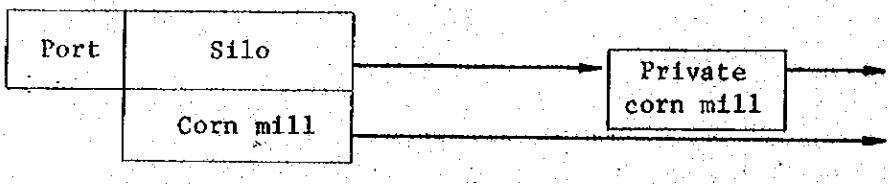
Costs considered in the economic analysis of this grain terminal operation include construction cost, personnel expenditure and labor cost, maintenance and replacement cost, electricity cost, fuel cost, insurance premium, miscellaneous and land rent.

The movement of freight is shown in the following charts:

Conventional:



Grain terminal construction:



3. Breakdown of economic benefits

(a) Saving on spillage

By use of grain terminal for bulk handling of grain it is estimated that spillage can be reduced by about 2% during tarnsit from silo to grits plant. (Annex 6-16) As estimated from the past experience of loading or unloading in the conventional distribution system, the grain terminal may contribute spillage decrease by 0.85% out of 2%.

Assessable value for reduced spillage of corn may be estimated as 857 Pesos per T. This is based on the U.S.A. Gulf FOB price calculated the mean price of corn prevailing at Chicago grain market (US$2.75 per bus, 1 T = 39.367 bus) for the period of January - December, 1976.

Therefore, the benefit received per metric ton of corn to be unloaded at the grain terminal is calculated as follows:

₱857/T x 0.0085 = ₱7.28/T

Annual unloading quantity is as shown in Annex 6-10.

(b) Saving of port handling cost

Conventional way of grain handling at the port will be abolished for the corn which is handled by the grain terminal. Therefore, economic benefit covers the port handling costs conventionally incurred, such as ₱5.50/T for Stevedore, ₱5.60/T for Arrastre, ₱1.40/T truck loading and ₱0.40/T for weighing, whose total amounts to ₱12.90/T.

Unloading quantity covering such costs is as indicated in Annex 6-10.

(c) Saving on spoilage

Saved percentage of spoilage from transportation and storage of corn in bulk is estimated at 4%.

Furthermore, decrease of spoilage during storage in the grain terminal is estimated at 3.0% as determined from time length of storage. (Annex 6-16)

Unit price of corn is quoted on the basis of P857 per T as described in the preceding item (a) spillage.

Corn for economic analysis is only that owned and stored by NGA for a long period, exluding commercial corn which will be handled through the grain terminal but will not be in storage for so long as period.

Annual quantity is as shown in Annex 6-10.

The spoilage decrease per metric ton of corn stored in the terminal is estimated as follows:

P857/T x 0.03 = P25.7/T

(d) Saving of operation and maintenance cost of warehouse

Installation of the grain terminal will reduce the need for renting warehouses by a corresponding capacity, thus eliminate their operation and maintenance costs.

Cost saving for operation and maintenance of such conventional warehouses may be regarded as benefit for economic analysis herein made.

Those costs mainly include personnel expenses for warehouse keepers and guardians and other expenses to be incurred incident to operation of the warehouse. It is assessed at unit cost of P16.21 annually per each metric ton of warehouse capacity. (See Annex 6-15.)

Accommodation capacity of the warehouse for economic analysis is the equivalent of the balance after deduction of capacity of facilities for temporary private use from total storage capacity of the grain terminal, as roughly indicated in the following table.

	Silo capacity	For private grain	For NGA's grain	Benefit (P1,000/Y)
1980-1989	10,000 T	380 T	9,620 T	156 T
1990-1999	15,000	625	14,375	233
2000-	15,000	1,350	13,650	221

(e) Saving of land transportation cost

Possible cost saving of land transportation as the result of grain terminal construction includes the following items:

Unit cost of transport from port to NGA's warehouse		P5.40/T
Unit cost for receiving and delivery charges to and from NGA's warehouse		P2.80/T
Unit cost of grits delivery from corn mill to port (one-third of total quantity handled by NGA is estimated to be supplied outside island).	5.4 x 1/3 =	P1.80/T
Total		P10.0/T

Quantity for economic analysis covers annual quantity of corn to be handled by NGA, as indicated in Annex 6-10.

(f) Transportation cost saving from installation of corn mill as part of the terminal complex

Whereas annual quantity is estimated at 24,000 T of unit transportation cost of P5.40/T:

24,000 T x P5.40/T = P130 thousand/year in saving

(g) Incremental added value from corn milling

The corn mill to be installed with the terminal complex will be operated for the purpose of meeting future increasing demand for grits, not depriving the existing private miller of their own business lines.

Therefore, the industrial activity for corn milling may be regarded as economic benefit.

Such benefit is assessed from current market prices of corn and grits. Annex 8-4 indicates wholesale prices quoted for corn and grits in the market of Cebu. Price difference for the Nov. 1975 - Oct. 1976 is averaged at P17.2 per each 50 kg, convertible to P344 per metric ton in gross value.

Since corn should be priced on the CIF basis, the net price after deduction of P12.9 for unloading charge, P5.40 for land

transportation and ₱1.40 for receiving charge is estimated as ₱324/T.

With recovering rate of corn into grits estimated at about 65% and by-product price averaged at an equal price level to corn price, the value added from processing of corn per metric ton into grits is calculated as:

$$324 \times 0.65 = ₱210.6/T$$

Benefit is calculated on the basis of ₱200/T value added for annual total of 24,000 T.

Then, 24,000 T/Y x ₱200/T = ₱4,800 thousand/year.

(h) Mitigation of freight loss and saving of handling cost due to increase of storage capacity

With completion of the grain terminal, NGA will be able to save the use of its warehouses of equal capacity to that of the grain terminal.

In Cebu there is a general tendency of warehouse shortage over the region.

Demand for additional installation of warehouse may become brisk to meet the requirement for storage of increased production.

The unfovorable conditions to be encountered from warehouse shortage may include not only freight loss from substitutional use of poorly conditioned facilities with resultant increase of handling cost, but also sharp rise or fall of price due to inadequate storage capacity below the required level. This will cause national economy a big loss.

Therefore, as the result of completion of the grain terminal, the warehouses in Cebu will be afforded sufficiently with as much reserved capacity as available from the grain terminal, which may be regarded as economic benefit. The rental charge for warehouse may express the benefit. The amount of rental charge payable to the cost of NGA is averaged monthly at ₱5.00 per square meter. If the warehouse is available for storage at a rate of 1.3 T per each square meter, benefit may be calculated, as in the case of the foregoing item (d), as follows:

$P5/M^2.mth \div 1.3\ T/M^2 \times 12\ mth/Y = P46.2/T$

	Silo capacity	For comm'l grain	For NGA grain	Benefit (P1,000/Y)
1980-1989	10,000 T	380 T	9,620 T	444 T
1990-1999	15,000	625	14,375	664
2000-	15,000	1,350	13,650	631

4. Breakdown of economic costs

(1) Construction cost

Total construction cost is regarded as economic cost in its full amount. It may be broken down as follows by years, though details are referred to in Annex 6-17.

1978	P15,345 thousand	) Initial construction cost
1979	28,700	
1988	1,681 thousand	) Additional construction cost after ten years
1989	3,364	
Total	P49,090 thousand	

(2) Personnel expense

Economic cost has been calculated from the full amount of personnel expense and labor cost as incorporated in the financial analysis. Annex 6-17 covers the full details. Annual payroll cost is averaged at P373 thousand.

(3) Maintenance and replacement cost

Economic cost has been calculated from full amount of maintenance and replacement cost as incorporated in the financial analysis. See Annex 6-17 for details.

(4) Electricity cost

Electricity cost covered by the economic analysis comprises depreciation cost for invested power generating and transmission facilities,

fuel oil cost per power generation and payroll cost, which accounts for 70% of total power rate in the Philippines today.

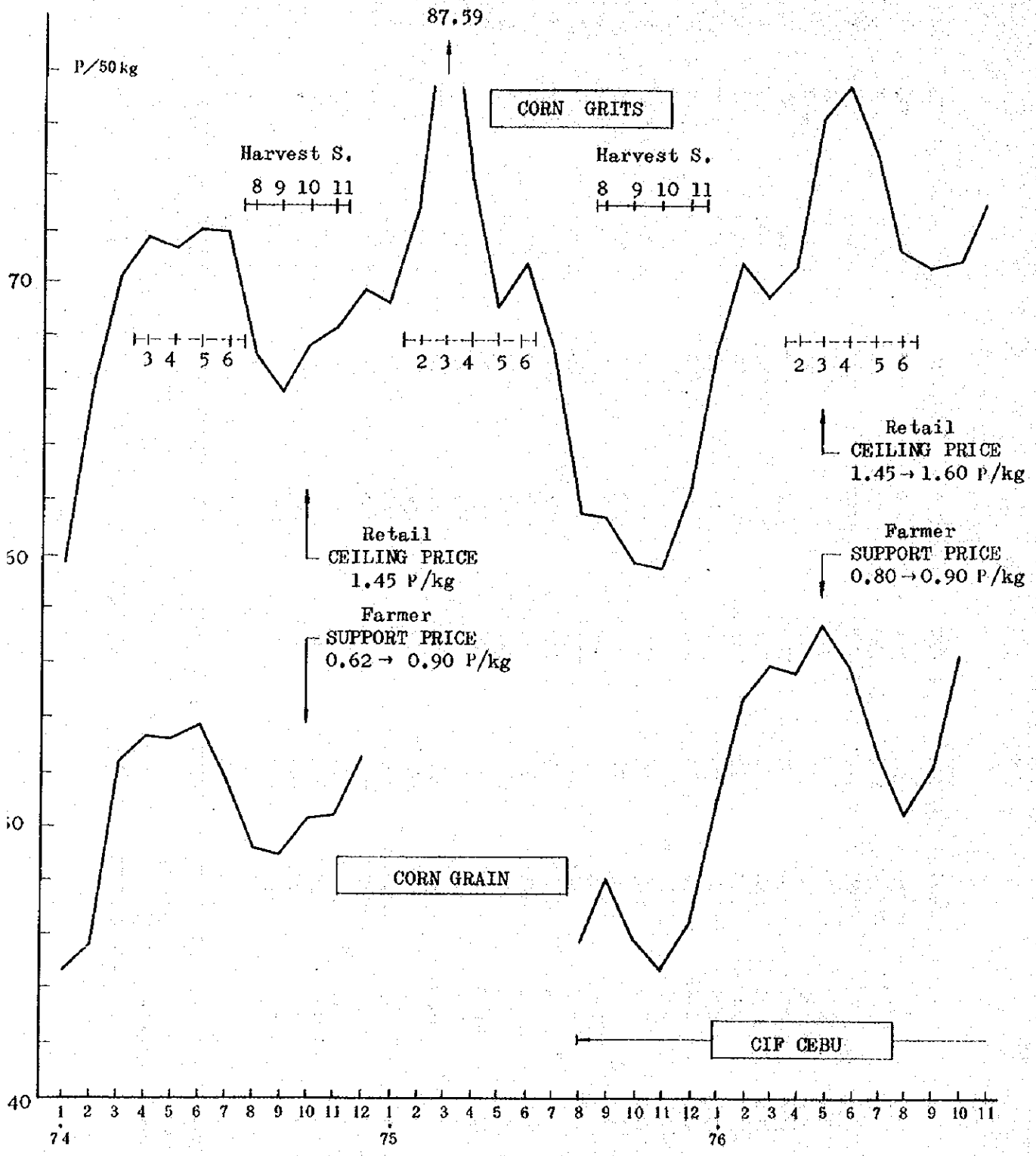
(5) Fuel cost, insurance premium and miscellaneous

Economic cost has been calculated from the full amount of costs as incorporated in the financial analysis. (Annex 6-17)

(6) Land rent

The proposed site is regarded as being of economic value. Annual total of P80 thousand is estimated as the rental charge being paid in the neighboirng site under similar conditions.

ANNEX 8-4 (1/1)



Monthly Wholesale Price (CEBU)

Cebu Grain Terminal ECONOMIC CASH FLOW (1) INFLOW Unit : ₱ 1000

Year	Year in a Row	Saving on Spillage	Saving of Port Handling	Saving on Spoilage	Saving of Warehouse Operation	Saving of Inland Transport	Saving of Transport due to Mill	Value Added from Milling	Increase of Storage Equipment	Total
1978	1	0	0	0	0	0	0	0	0	0
79	2	0	0	0	0	0	0	0	0	0
80	3	247	439	874	156	340	130	4,800	444	7,430
81	4	253	448	892	156	347	130	4,800	444	7,470
82	5	344	610	907	156	353	130	4,800	444	7,744
83	6	353	626	923	156	359	130	4,800	444	7,791
84	7	362	641	938	156	365	130	4,800	444	7,836
85	8	371	685	953	156	371	130	4,800	444	7,910
86	9	380	673	966	156	376	130	4,800	444	7,925
87	10	389	689	979	156	381	130	4,800	444	7,968
88	11	397	704	992	156	386	130	4,800	444	8,009
89	12	408	722	1,005	156	391	130	4,800	444	8,056
90	13	417	739	1,018	233	396	130	4,800	664	8,397
91	14	427	757	1,031	233	401	130	4,800	664	8,443
92	15	438	777	1,046	233	407	130	4,800	664	8,495
93	16	451	799	1,061	233	413	130	4,800	664	8,551
94	17	462	819	1,077	233	419	130	4,800	664	8,604
95	18	474	840	1,092	233	425	130	4,800	664	8,658
96	19	488	861	1,105	233	430	130	4,800	664	8,711
97	20	498	882	1,118	233	435	130	4,800	664	8,760
98	21	511	906	1,131	233	440	130	4,800	664	8,815
99	22	524	929	1,144	233	445	130	4,800	664	8,869
2000	23	537	952	1,157	221	450	130	4,800	631	8,878
1	24	553	980	1,174	221	457	130	4,800	631	8,946
2	25	568	1,006	1,192	221	464	130	4,800	631	9,012
3	26	586	1,038	1,210	221	471	130	4,800	631	9,087
4	27	604	1,069	1,228	221	478	130	4,800	631	9,161
5	28	621	1,102	1,246	221	485	130	4,800	631	9,236
6	29	640	1,134	1,264	221	492	130	4,800	631	9,312
7	30	659	1,167	1,282	221	499	130	4,800	631	9,389
		12,962	22,994	30,005	5,658	11,676	3,640	134,400	16,128	237,463

Cebu Grain Terminal — ECONOMIC CASH FLOW (2) OUTFLOW & METFLOW — Unit: ₱ 1,000

Year	Year in a Row	Outflow: Construction Cost	Personnel Expense	Maintenance	Electricity	Fuel	Insurance	Miscel-laneous	Rent	Total	Net flow
1978	1	15,345							80	15,425	△15,425
79	2	28,700	149					7	80	28,936	△28,936
80	3		373	289	683	282	440	118	80	2,265	5,165
81	4		373	310	684	282	427	118	80	2,274	5,196
82	5		373	329	705	282	414	120	80	2,303	5,441
83	6		373	349	707	282	401	121	80	2,313	5,478
84	7		373	371	709	282	388	121	80	2,324	5,512
85	8		373	393	711	282	376	122	80	2,337	5,573
86	9		373	412	713	282	364	123	80	2,347	5,578
87	10		373	421	715	282	352	123	80	2,346	5,622
88	11	1,681	373	454	718	282	333	123	80	4,044	3,965
89	12	3,364	373	474	720	282	322	124	80	5,739	2,317
90	13		373	1,040	722	282	360	158	80	3,015	5,382
91	14		373	529	725	282	355	126	80	2,470	5,973
92	15		373	529	727	282	342	126	80	2,459	6,036
93	16		373	529	730	282	320	126	80	2,440	6,111
94	17		373	529	733	272	301	127	80	2,425	6,179
95	18		373	1,582	736	282	290	179	80	3,522	5,136
96	19		373	529	739	282	287	126	80	2,416	6,295
97	20		373	529	741	282	275	126	80	2,406	6,354
98	21		373	529	744	282	264	126	80	2,398	6,417
99	22		373	529	747	282	253	125	80	2,389	6,480
2000	23		373	2,417	750	282	241	219	80	4,362	4,516
1	24		373	529	754	282	249	125	80	2,392	6,554
2	25		373	529	757	282	237	125	80	2,383	6,629
3	26		373	529	762	282	226	125	80	2,377	6,710
4	27		373	529	766	282	214	125	80	2,369	6,792
5	28		373	4,995	770	282	202	348	80	7,050	2,186
6	29		373	529	774	282	236	126	80	2,400	6,912
7	30		373	529	778	282	214	126	80	2,382	7,007
Total		49,090	10,593	21,242	20,520	7,896	8,683	3,884	2,400	124,308	113,155

CEBU GRAIN TERMINAL

PRESENT VALUEINFLOW-OUTFLOW CURVE

(ECONOMIC)