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Main Report

DEPARTMENT OF TRANSPORTATION
AND COMMUNICATION

ENVIRONMENTAL IMPACT STATEMENT
FOR THE PROPOSED PANGLAO AIRPORT

PREPARED FOR:

CENTRAL VISAYAS PROJECTS DEVELOPMENT
COORDINATING COMMITTEE

PREPARED BY:

TCGI ENGINEERS

WITH

TECHNICAL ASSISTANCE

OF

2 PACIFIC CONSULTANTS, INT'L.

ENVIRONMENTAL IMPACT STATEMENT
PROPOSED PANGLAO AIRPORT

TABLE OF CONTENTS

		Page
SECTION 1	NAME & ADDRESS OF PROJECT PROPONENT	1 - 1
SECTION 2	TYPE OF PROJECT	2 - 1
	2.1 Phased Development	
	2.1.1 Phase I	2 - 1
	2.1.2 Phase II	2 - 2
SECTION 3	OVERVIEW SUMMARY	
	3.1 General	3 -1
	3.2 Discussion of Pre-Construction / Construction Phase Impacts	3 -5
	3.2.1 Alteration of Natural Drainage	3 -5
	3.2.2 Potential Soil Erosion	3 -5
	3.2.3 Air Pollution	3 - 5
	3.2.4 Noise Pollution	3 - 5
	3.2.5 Water Pollution	3 - 5
	3.2.6 Loss of Vegetative Cover	3 - 6
	3.2.7 Fish & Wildlife Disturbance	3 - 6
	3.2.8 Vehicular Traffic	3 - 6
	3.2.9 Disruption of Existing Community & Displacement of People	3 - 6
	3.2.10 Land Use	3 - 6
	3.2.11 Employment	3 - 6
	3.2.12 Business	3 - 7
	3.3 Discussion of Operation Phase Impacts	3 - 9
	3.3.1 Soil Erosion	3 - 9
	3.3.2 Increase Water Demand	3 - 9
	3.3.3 Liquid Waste	3 - 9
	3.3.4 Solid Waste	3 - 9

TABLE OF CONTENTS

		Page
	3.3.5 Fuel Storage Tanks / Pipelines	3 - 10
	3.3.6 Air / Noise Pollution	3 - 10
	3.3.7 Aesthetics	3 - 10
	3.3.8 Increase in Population	3 - 10
	3.3.9 Improvement of Basic Services	3 - 11
	3.3.10 Improvement of Health & Safety	3 - 10
	3.3.11 Employment & Income	3 - 11
	3.3.12 Land Use	3 - 11
	3.3.13 Women	3 - 11
	3.3.14 Traffic	3 - 12
	3.4 Mitigating Measures	3 - 12
	3.4.1 Pre-Construction / Construction Phase	3 - 12
	3.4.2 Operation Phase	3 - 13
	3.5 Data Gaps & Limitations Of the Assessors in the Preparation of the EIS	3 - 15
SECTION 4	THE PROJECT SETTING	4 - 1
	4.1 Declaration and Objective	4 -1
	4.1.1 Land Value of the Existing Airport	4 -1
	4.1.2 Savings in Annual O&M of Existing Airport	4 -2
	4.1.3 Value-Added from Tourist Spending	4 -2
	4.1.4 Savings in Passenger Diversion Costs	4 -2
	4.2 The Need	4 -3
	4.3 Alternatives	4 -3
	4.3.1 Location	4 - 5
	4.3.2 Airspace	4 - 6
	4.3.3 Wind Coverage	4 - 6
	4.3.4 Airport Access	4 - 7
	4.3.5 Construction Considerations	4 - 7
	4.3.6 Environmental Considerations	4 - 10
	4.4 Associated Projects	4 - 13

TABLE OF CONTENTS

		Page
SECTION 5	THE PROPOSAL	5 - 1
	5.1 General	5 -1
	5.2 General Layout	5 - 2
	5.3 Pre-Construction Details	5 - 2
	5.3.1 Major Construction Activities	5 - 4
	5.3.2 Temporary Road Plan	5 – 6
	5.4 Operation & Maintenance	5 - 8
	5.4.1 Nature of Raw Materials to be Utilized and their Resources	5 -8
	5.4.2 Processes & Operational Procedures of the Project	5 - 8
	5.4.3 Noise Wastes, Emission, Effluents to be Emitted & Disposed of	5 - 9
	5.4.4 Manpower & equipment Requirement	5 - 10
	5.4.5 Expected Project Size and Scale	5 - 12
	5.4.6 Technical & Operation Procedures Including Flow Diagrams, Timing Schedules and Inspection	
	5.4.7 Maintenance Under Normal Conditions Type of Expected Maintenance, Predicted Maintenance Problems & Plans for any Partial or Complete Shutdown Associated with Maintenance Problems	5 -12
	5.4.8 Number of Jobs Available to Local Residents and from the Outside by Occupation	5 -14
	5.5 Contingency Plans	5 – 14
	5.6 Abandonment	5 - 15
SECTION 6	A BRIEF HISTORY OF PAST ENVIRONMENTAL CONDITIONS & A DESCRIPTION OF THE EXISTING ENVIRONMENT & RESOURCES USE	6 - 1
	6.1 Climate	6 - 1
	6.2 Terrain	6 - 5
	6.2.1 Physiography & Topography	6 - 5

TABLE OF CONTENTS

		Page
6.2.2	Geologic Units	6 - 6
6.2.3	Geologic Structures	6 - 8
6.2.4	Geologic Hazards	6 - 8
6.2.5	Floods	6 - 11
6.3	Hydrology	6 - 11
6.3.1	Groundwater	6 - 12
6.3.2	Groundwater Quality	6 - 12
6.4	Oceanography	6 - 16
6.4.1	Coastal Water Quality	6 - 16
6.4.2	Tides	6 - 18
6.4.3	Bathymetry	6 - 19
6.4.4	Wind field	6 - 20
6.4.5	Sedimentation	6 - 20
6.5	Atmosphere	6 - 20
6.6	Vegetation	6 - 24
6.6.1	Plant Communities	6 - 24
6.6.2	Species Diversity	6 - 24
6.7	Fish & Wildlife	6 - 24
6.8	Land Use	6 - 25
6.8.1	Agricultural Areas	6 - 25
6.8.2	Coconut Plantation	6 - 25
6.8.3	Bushland	6 - 25
6.8.4	Grassland / Open Areas	6 - 25
6.8.5	Built-up Areas	6 - 27
6.8.6	Quarry	6 - 27
6.9	Socio-Economic Aspects	6 - 27
6.9.1	Population & Number of Households	6 - 27
6.9.2	Population Density	6 - 27
6.9.3	Migration	6 -28
6.9.4	Education	6 - 28
6.9.5	Employment	6 - 28
6.9.6	Housing Infrastructure	6 - 28

TABLE OF CONTENTS

		Page
6.9.7	Business Establishment	6 - 29
6.9.8	Transportation	6 - 29
6.9.9	Community Infrastructure	6 - 29
6.9.10	Rich Past Heritage / Cultural Attractions	6 - 30
SECTION 7	FUTURE ENVIRONMENTAL CONDITIONS WITHOUT THE PROJECT	7 - 1
7.1	General	7 -1
7.2	Climate	7 - 1
7.3	Terrain	7 -1
7.4	Hydrology	7 - 1
7.5	Oceanography	7 -2
7.6	Atmosphere	7 - 2
7.7	Vegetation	7 -2
7.8	Fish & Wildlife	7 -2
7.9	Land & Resource Use	7 - 2
7.10	Socio-Economic Aspects	7 -3
SECTION 8	PREDICTION AND ASSESSMENT OF IMPACTS	8 – 1
8.1	General	8 -1
8.2	Pre-Construction / Construction Phase Impacts	8 -3
8.2.1	Alteration of Natural Drainage	8 -3
8.2.2	Potential Soil Erosion	8 -3
8.2.3	Air Pollution	8 - 3
8.2.4	Noise Pollution	8 -4
8.2.5	Water Pollution	8 – 5
8.2.6	Loss of Vegetation Cover	8 - 5
8.2.7	Fish and Wildlife Disturbance	8 - 5
8.2.8	Vehicular Traffic	8 - 5
8.2.9	Disruption of Existing Community and Displacement of People	8 - 6
8.2.10	Land Use	8 - 6
8.2.11	Employment	8 - 6
8.2.12	Business	8 - 6
8.3	Operation Phase Impact	8 - 8
8.3.1	Soil Erosion	8 - 8
8.3.2	Increase Water Demand	8 - 8

TABLE OF CONTENTS

			Page
	8.3.3	Water Pollution	8 - 8
	8.3.4	Liquid Water	8 - 8
	8.3.5	Solid Wastes	8 - 9
	8.3.6	Fuel Storage Tank / Pipelines	8 - 9
	8.3.7	Air-Noise Pollution	8 - 10
	8.3.8	Aesthetics	8 - 10
	8.3.9	Increase in Population	8 -10
	8.3.10	Improvement of Basic Services	8 - 11
	8.3.11	Improvement of Health & Safety	8 -11
	8.3.12	Employment and Income	8 - 11
	8.3.13	Land Use	8 - 11
	8.3.14	Women	8 - 11
SECTION 9	CONTINGENCY PLAN		9 - 1
SECTION 10	ENVIRONMENTAL BREIFINGS & MONITORING		10 - 1
	10.1 General		10 -1
	10.1.1	Pre-Construction / Construction	10 -1
	10.1.2	Operation Phase	10 -2
	10.2 Monitoring		10 - 2
	10.2.1	Pre-Construction / Construction Phase	10 - 2
	10.2.2	Operation Phase	10 - 3
	10.3 Impact Reporting		10 - 5
	10.3.1	Construction Phase	10 - 5
	10.3.2	Operation Phase	10 - 6
SECTION 11	MITIGATING MEASURES		11 - 1
	11.1 Pre-Construction / Construction Phase		11 - 1
	11.1.1	Alteration of Natural Drainage	11 - 1
	11.1.2	Soil Erosion	11 - 3
	11.1.3	Dust Generation Control	11 - 3
	11.1.4	Control of Noise Generation	11 - 5
	11.1.5	Greening of the Project Site to Improve Aesthetics	11 - 5

TABLE OF CONTENTS

		Page
11.1.6	Resettlement	11 - 5
11.1.7	Compensation of Crop Damage	11 - 6
11.1.8	Traffic Plan	11 - 6
11.1.9	Workers & Public Safety	11 -6
11.1.10	Local Labor Employment	11 - 7
11.2	Operation Phase	11 - 8
11.2.1	Extraction of Groundwater	11 - 8
11.2.2	Wastewater	11 - 8
11.2.3	Solid Waste	11 - 10
11.2.4	Fuel Storage Tanks	11 - 11
11.2.5	Oil-Water Separator	11 - 11
11.2.6	Control of Air Pollution	11 - 11
11.2.7	Control of Air Pollution Sources other than Cars & Aircraft	11 - 13
11.2.8	Control of Noise Generation	11 - 13
11.2.9	Implementation of Pro-Active Pollution Prevention Program	11 - 13
11.2.10	Increase Demand on Road Services and Parking vis-a-vis with Traffic Generation	11 - 14
SECTION 12	RESIDUAL / UNAVOIDABLE IMPACTS	12 - 1
SECTION 13	INFORMATION DEFICIENCIES	13 - 1
SECTION 14	LIST OF DATA & REFERENCES USED IN THE STUDY	14 - 1
SECTION 15	CONSULTATION & COMMENTS INCLUDING PUBLIC RECOMMENDATIONS	15 - 1

APPENDICES

Appendix I	Accountability Statement of EIS Preparers
Appendix II	EIS Preparers' (CV) Curriculum Vitae
Appendix III	Scoping Reports & Tourism Estate Task Force Meeting
Appendix IV	Endorsement from the Local Government Unit
Appendix V	Photographs of Three (3) Alternative Sites & Existing Airport Facilities
Appendix VI	Summary Matrix of Environmental Management Plan
Appendix VII	Accountability Statement of Project Proponent
Appendix VIII	Barangay Certification
Appendix IX	Results of Water & Air Sampling
Appendix X	Results of Noise Measurement
Appendix XI	Geotechnical Study-Boring Logs & Summary of Test Results (Advanced Engineering Study)
Appendix XII	Water Resources Investigation & Geo-Resistivity Survey for the Proposed Panglao Airport
Appendix XIII	Perception Survey Results

LIST OF FIGURES

		Page
Figure 2 –1	Airport Layout Plan Phase I	2 - 3
Figure 2 –2	Airport Layout Plan Phase II	2 - 4
Figure 4 –1	Airport Three (3) Alternative Sites	4 - 4
Figure 5 –1	Location Map	5 – 3
Figure 5 -2	Temporary Road Plan	5 – 7
Figure 5 -3	Organizational Set-up of the Airport Personnel	5 – 11
Figure 5 -4	Passenger & Baggage Flow in the Airport	5 – 13
Figure 6 –1	Climate Map of the Philippines	6 - 2
Figure 6 –2	Topographic Map	6 - 7
Figure 6 –3	Geologic Map	6 - 9
Figure 6 -4	Seismicity Map	6 – 10
Figure 6 - 5	Water& Air Sampling Layout	6 - 13
Figure 6 - 6	General Land Use Map	6 - 26
Figure 11 - 1	Drainage Layout Plan	11 – 2
Figure 11 - 2	Structural Erosion Prevention & Sediment Control	11 – 4
Figure 11 - 3	Process Flow Diagram	11 – 12

LIST OF TABLES

		Page
Table 3.1	Pre-Construction / Construction Phase	3 -1
Table 3.2	Operation Phase	3 - 7
Table 5.1	Alternative Sites Evaluation	5 – 1
Table 5.2	Project Implementation Schedule	5 – 5
Table 6.1	Climatological Normals at Tagbilaran, Bohol	6 – 1
Table 6.2	Climatological Normals at Dumaguete City, Negros Oriental	6 – 3
Table 6.3	Climatological Normals at Mactan, Cebu	6 – 3
Table 6.4	Climatological Extremes at Mactan, Cebu	6 – 4
Table 6.5	Result of Groundwater Analysis	6 – 14
Table 6.6	Results of Chemical Analysis of Coastal Water around Panglao Island, Bohol	6 – 15
Table 6.7	Results of Chemical & Biological Analysis of Nearest Coastal Water	6 - 18
Table 6.8	Observed Air Quality in Panglao island, Bohol	6 - 22
Table 6.9	Observed Ambient Air Concentrations of SO2, NO3, Pv, NTSP in Comparison with the DENR NAAQS (in ug/Ncm)	6 - 23
Table 8.1	Predicted Impacts During Construction Phase & Its Mitigation	8 - 1
Table 8.2	Expected Noise Levels from the Construction Equipment, dBA	8 – 4
Table 8.3	DENR Standards for Noise in General Areas	8 – 4
Table 8.4	Predicted Impacts During Operation Phase	8 – 7
Table 10.1	Summary of Monitoring Activities Pre-Construction / Construction and Operation	10 - 4

SECTION 1 Name and Address of Project Proponent

Name of the Project	:	Panglao Airport Project Panglao Municipality, Panglao Island, Bohol, Central Visayas Airports Package Project
Project Proponent	:	Department of Transportation and Communications
Address	:	6th Floor, Unit 6, Columbia Tower Ortigas Avenue, Mandaluyong City
Telephone Number	:	727-7948 / 58, 727-7960 to 79
Telefax	:	727-7948, 727-1703
Contact Person	:	George D. Esguerra Assistant Secretary for Planning
Project Coordinating Committee	:	Central Visayas Projects Development Coordinating Committee (CVPDCC)
Address	:	3rd Floor, Cebu Liok, Kui Building, No. 6 Humabon Avenue, North Reclamation Area, Cebu City
Telephone Number	:	032-233-9198
Contact Person	:	Crescencio M. Rocamora OIC – Project Director

SECTION 2 Type of Project

The planning criteria is calculated for two main implementation phases, the years 2005 and 2015 at which time it is assumed that the new airport will start operating. See **Figure 2 -1** and **2 -2**, Airport Layout Plan Phased Development, Phase I and II.

The proposed development is categorized as an infrastructure project. It consist of the following features:

2.1 PHASED DEVELOPMENT

2.1.1 Phase I

It is recommended that a total area of **170 hectares** be provided at the onset of development which includes the following:

a. Runway : **2000 meters x 45 meters** with **7.5 meters** paved shoulders on each side and **60 x 45 meters** stopway at both ends.

b. Aircraft Parking Area : **113.5 meters x 230 meters** for three (3) type C aircraft with provision for (1) type D aircraft and an area for general aviation

c. Two stub taxiways from the apron to the runway **265.5 meters x 23 meters** with **7.5 meters** paved shoulders on each side.

d. **One (1)** ILS at the prevailing threshold

e. Terminal area facilities (passenger terminal building, cargo terminal building, ATC tower, etc.)

f. Airport Maintenance Building and Airport utilities such as Water Supply, Solid Waste Disposal, Drainage System etc.

g. All necessary Visual and Navigational Aids Equipment

h. Construction of power house and installation of standby generator

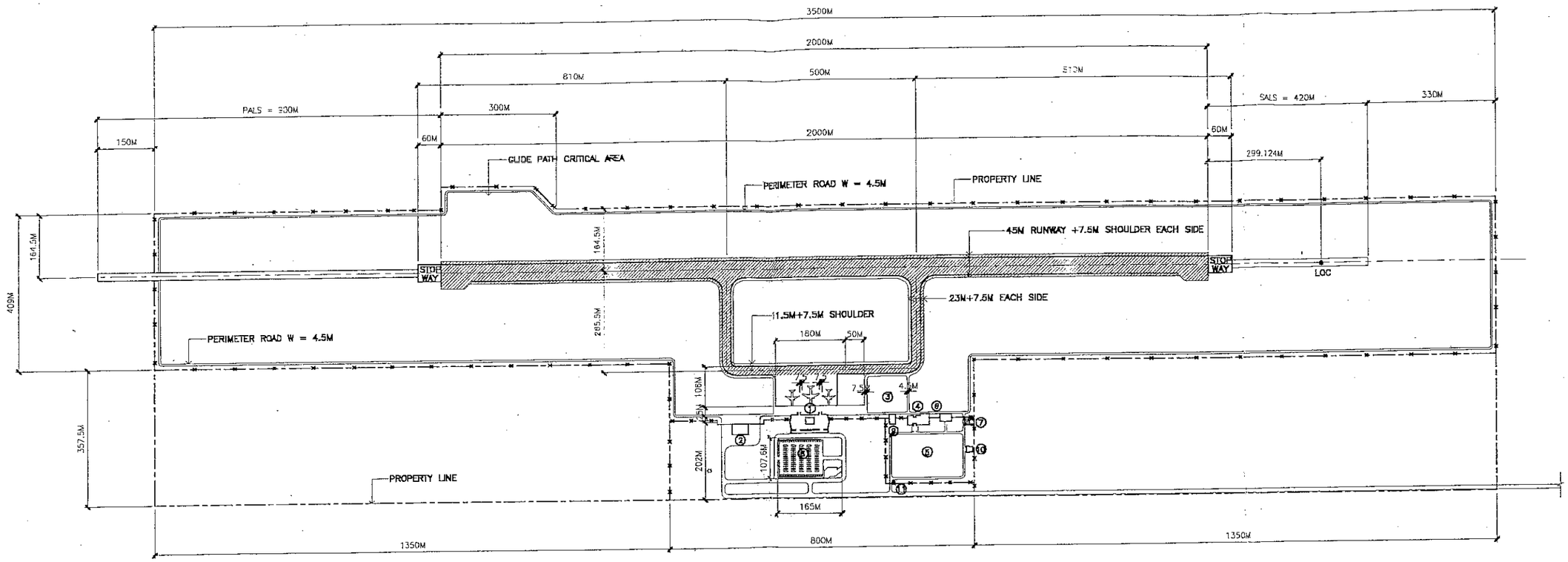
i. Provision of security fence.

2.1.2 Phase II

a. Extension of runway up to **2500 meters** with **45 meters x 60 meters** stopway at both ends.

b. Construction of a **23 meter** wide parallel taxiway and four exit taxiways with **7.5 meter** paved shoulder on each side.

c. Expansion of the apron to accommodate a total of five aircrafts and an area for general aviation.



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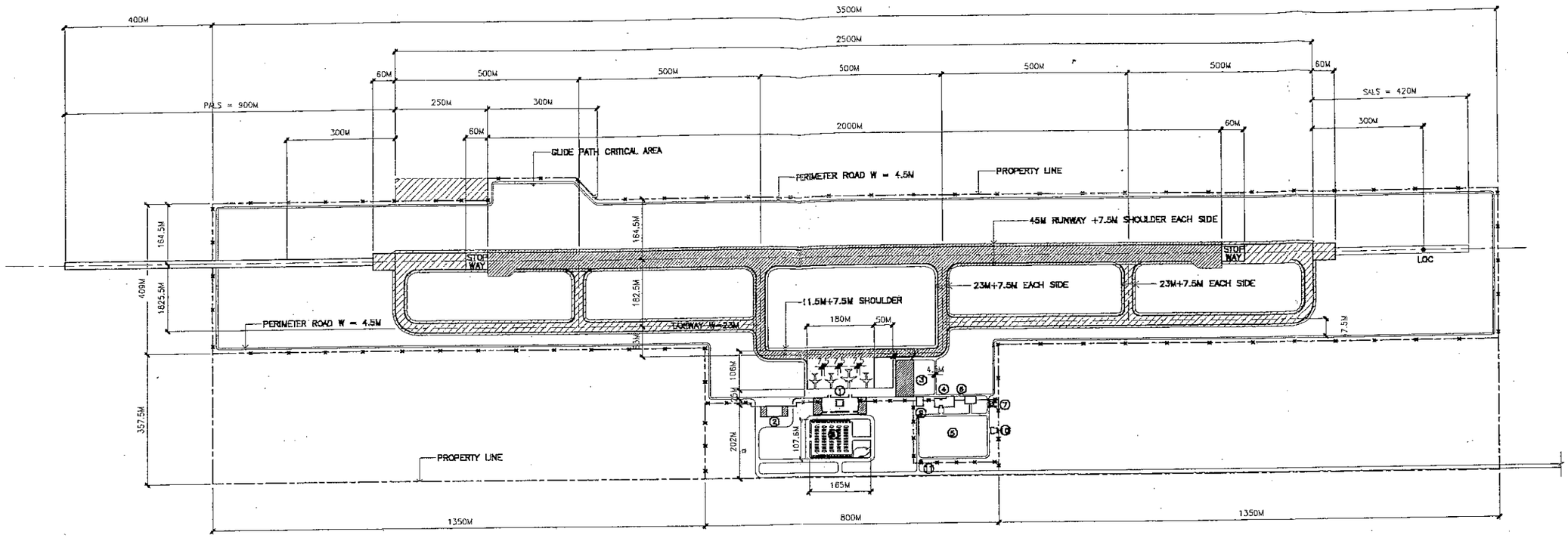
SCALE MTS.

LEGEND:

① PASSENGER TERMINAL
② CARGO TERMINAL BLDG.
③ GENERAL AVIATION
④ ATC/ARFF BUILDING
⑤ FUEL FARM FACILITY
⑥ AIRPORT MAINTENANCE BUILDING
⑦ SEWAGE TREATMENT PLAN
⑧ CARPARK
⑨ POWERHOUSE
⑩ PUMPHOUSE/WATER RESERVOIR
⑪ GUARDHOUSE

FIGURE 2-1 AIRPORT LAYOUT PLAN (PHASE 1)



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LEGEND:

① PASSENGER TERMINAL
② CARGO TERMINAL BLDG.
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⑥ AIRPORT MAINTENANCE BUILDING
⑦ SEWAGE TREATMENT PLAN
⑧ CARPARK
⑨ POWERHOUSE
⑩ PUMPHOUSE/WATER RESERVOIR
⑪ GUARDHOUSE
PHASE II

FIGURE 2-2 AIRPORT LAYOUT PLAN (PHASE II)

SECTION 3 Overview Summary

3.1 GENERAL

Solving the overcrowding problem in Tagbilaran City, it was proposed that the existing Tagbilaran Airport would be relocated in Barangay Tawala including portions of Barangays Bolod and Danao Municipality, Panglao Island, Bohol. The airport will be sited in an undeveloped area covering a total of approximately 170 hectares with an estimated project cost of ₱ **2.783 Billion** to be developed in two phases.

A 4D airport reference code was used in planning the terminal area development with provisions for a 4E code requirement for the major airfield separation. This code shall dictate the design aircraft for the airport which is two type C aircraft (B737 or A320), a reserved parking position for a visiting, disabled or a delayed aircraft which is one type D aircraft, (Airbus A300) and an area for general aviation.

Based on the revised traffic forecast stated in the Advanced Engineering Study of the Proposed Panglao Airport, the ***peak hour passengers*** served by the airport is 304 during the first phase and 770 during the second phase. The Panglao Airport will be designed to comply with established international standards and will ensure maximum operational efficiency, convenience and flexibility.

The probable environmental impacts, significance, mitigating/enhancement measures based on the environmental impact assessment conducted are shown in **Table 3.1** below:

Table 3.1 Pre-Construction / Construction Phase

Environmental Aspects	Impacts	Nature	Degree of Impact	Mitigation
A. Physical/Chemical Effects				
Topography and drainage	Land subsidence/Alteration of natural drainage pattern that could lead to localized flooding/soil erosion	Negative	Minimal	Setting up the necessary structural support foundations and adequate drainage channels/use of interceptor dikes, pipe slope drains, sediment trap

Environmental Aspects	Impacts	Nature	Degree of Impact	Mitigation
Soil Quality	Soil contamination due to oil/fuel spill	Negative	Minimal	Close supervision during construction stage; provision of secondary containment and lining to fuel and oil storage areas; train workers re: proper handling and disposal of used oil and other hazardous waste; strict enforcement of proper fuel/oil handling procedures.
Air Quality	Potential increase of ambient TSP or dust concentration around project site Potential Increase of ambient NO_2 and SO_2 concentrations from engine exhausts	Negative Negative	Significant Insignificant	Regular sprinkling of exposed areas with water; Imposition of speed limits on hauling trucks.
Noise and vibration	Potential increase in noise levels around project site	Negative	Insignificant	Noise generating construction activities should not be conducted from 7:00 p.m. to 7:00 a.m.

Environmental Aspects	Impacts	Nature	Degree of Impact	Mitigation
Water Quality	Potential increase in sediment load	Negative	Insignificant	Drainage channels should be improvised.
	Potential increase in BOD loading due to sanitary discharges	Negative	Insignificant	Provision of portable toilets and proper disposal of wastes.
	Possible oil contamination	Negative	Insignificant	Provision of secondary containment and lining to fuel/oil storage areas.
B. Ecological Effects				
Flora and Fauna	Loss of vegetation	Negative	Minimal	Selective removal of vegetation cover; re-greening of project site at the conclusion of the construction phase
	Fish and wildlife Disturbance	Negative	Minimal	
C. Aesthetics				
Aesthetic	No adverse impact on general aesthetics	Negative	Insignificant	No mitigation measures needed
D. Socio-Economic Effects				
Vehicular traffic	Possible congestion in narrow barangay roads.	Negative	Moderately significant	Contractors will formulate comprehensive traffic plan.
	Potential increase in risk of road accidents	Negative	Moderately significant	Strict enforcement of traffic rules.
Community Structure	Disruption of existing community	Negative	Insignificant	No mitigation is required. People will easily adjust to the new neighborhood
	Resettlement and	Positive and	Significant	Resettlement and

Environmental Aspects	Impacts	Nature	Degree of Impact	Mitigation
	Land titling	negative		just compensation as well as alternative livelihood are recommended/ Titling of land provided to relocated families Resettlement should be well planned and provided with usual amenities.
Land Use	Alteration of land use and increase in land valuation Decrease of space for agricultural land	Positive Negative	Moderately significant Minimal	The Bohol Provincial Govt. and LGU concerned within the project site should generate a land use and zoning plan of the area around the project site. Loss of agricultural land is offset by increase in land value
Employment	Availability of construction jobs to local residents Increase in income	Positive Positive	Significant Significant	Qualified local residents will be given priority in hiring. No mitigation measures required
Business	Increase in business receipts	Positive	Significant	No mitigation measures

3.2 DISCUSSION OF PRE-CONSTRUCTION /CONSTRUCTION PHASE IMPACTS

3.2.1 Alteration of Natural Drainage

It is possible that the construction activities will obstruct the natural drainage pattern in the area. During construction phase especially in times of heavy down pours, the prevention of flooding in the proposed project area is necessary. Construction of drainage structures around the project site would allow efficient flow of surface runoff to natural drainage system.

3.2.2 Potential Soil Erosion

Any horizontal construction activities especially for site development will definitely cause some soil erosion. Without any mitigating measures, the amount of eroded soil will be significant during rainy periods on large exposed areas. Run-off water will transport soil particles that will result to siltation of water bodies in the project area.

3.2.3 Air Pollution

Expected air emission sources are from delivery trucks during hauling of construction materials and from the construction equipment used. However, magnitudes of these emissions are relatively small and could easily be dispersed by the wide air space in the site. Hence, the expected impact would be minimal. A moderate dust generation is expected during the dry seasons due to ground preparation and earthwork activities.

3.2.4 Noise Pollution

Operation of the various construction equipment will be the major source of noise generation during construction.

3.2.5 Water Pollution

During construction stage, about 500-700 skilled and unskilled workers are to be hired. At a generation rate of 50L/cap/day, with the assumption that the hiring will be 100% (700 workers) during the heyday of the construction period, the estimated domestic wastewater generation per day is about 35 cubic meter.

Water quality of the surrounding water bodies may be impaired due to the direct discharge of sanitary wastewater.

3.2.6 *Loss of vegetative cover*

Clearing and other required civil works to be undertaken in the project area during construction stage will result to vegetation loss. However, the impact is only minimal since the site is mostly covered by shrubs and grasses.

3.2.7 *Fish and Wildlife Disturbance*

Birds and other species will be disturbed due to vegetation removal. The impact is considered minimal since the area is an open ecosystem. It will not result in unwarranted hazards to endangered species as there are no endangered species recorded in the project site.

3.2.8 *Vehicular traffic*

Congestion in narrow barangay roads and at the entrance to the site will slightly increase due to the hauling of construction materials. However, the average daily trips will not be significant since the construction schedules will be spread over a long period.

3.2.9 *Disruption of existing community and displacement of people*

The resettlement of more or less 50 households from the project site will alter population size and composition in the barangay if they are relocated outside of it. However, if the relocation site will be within the same barangay, there will be no major demographic alteration in the area.

The impact of the displacement of the affected population will depend on the housing characteristics and their distribution in the resettlement site.

3.2.10 *Land Use*

It will not make unwarranted accelerated use of scarce resources in favor of short-term over long-term economic needs. The project site is not considered a prime agricultural land or a primary forestland. Its use as an airport site will generate greater benefits to the immediate and bigger community than its present land uses, which are characterized as marginal/subsistence agriculture and unproductive grassland/shrub land.

3.2.11 *Employment*

The project can employ local residents during the construction phase. It can provide enough work to substantially reduce the unemployment in Bohol particularly in Panglao Island.

3.2.12 Business

Business opportunities like sari-sari stores are expected to crop up in the island due to influx of construction workers in the site.

Table 3.2 - Operation Phase

Environmental Aspects	Impacts	Nature	Degree of Impact	Mitigation
A. Physic-Chemical Impacts				
Erosion and sedimentation	Better control of erosion and sedimentation	Negative	Insignificant	No mitigation measures needed
Water Usage	Increase water demand	Negative	Insignificant	No mitigation measures needed
Water quality	Potential contamination of water quality	Negative	Significant	Wastewater treatment facility
Air quality	Slight increase in ambient concentration of air pollutants	Negative	Insignificant	No mitigation measures needed
Noise	Noise pollution	Negative	Moderately significant	Relocation of affected households and change of land use; provision of noise control structures
B. Ecological Effects				
Terrestial Ecology	Disturbance to wildlife	Negative	Insignificant	No mitigation needed
C. Aesthetics				
Aesthetics	Improve the aesthetic appeal of the landscape	Positive	Significant	Includes maintenance of landscape and planting of trees
D. Socio- Economic Effects				
Population	Increase in population density	Negative	Minimal	No mitigation needed No mitigation measures

Environmental Aspects	Impacts	Nature	Degree of Impact	Mitigation
				needed
Labor and Employment and income	Availability of employment both at the airport and other business establishments that will open as a result of the airport Increase in family income	Positive Positive	Significant Significant	Encourage local hire Provide training on micro enterprise No mitigation measures needed
Culture and lifestyle	Change in lifestyle and values	Negative	Moderate	No mitigation measures needed
Basic Services	Improvement of basic services	Positive	Significant	No mitigation measures needed
Health and safety	Improvement of health and safety	Positive	Significant	No mitigation measures needed
Land Use	Change of land use from agriculture to possibly commercial	Negative	Moderately significant	Planned development is recommended
Women	Increase earning capacity	Positive	Significant	Provide training to manage change
Traffic	No significant increase in traffic	Negative	Insignificant	Monitor any increase in traffic in the future to implement traffic management

3.3 DISCUSSION OF OPERATION PHASE IMPACTS

3.3.1 Soil Erosion

Soil erosion during the lifetime of the project is expected to decrease and much lower than the present rate due to a shift of land use from agricultural. Implementation of the project would mean more covered areas and less soil to be exposed directly to rainfall. Erosion by overland flows will also be less since the entire development will be provided with lined canals and more paved areas.

3.3.2 Increase Water Demand

Increase in water demand is expected to be insignificant during the operation phase of the airport. Airline passengers stay for only about less than two (2) hours in the waiting area where small volume of water will be used.

3.3.3 Liquid Wastes

Expected volume of wastewater to be generated in the airport operation is $90m^3$/day. It has the following characteristics:

Biochemical Oxygen Demand (BOD)	=	250 mg/L
Chemical Oxygen Demand	=	500 mg/L
Total Suspended Solids, TSS	=	250 mg/L
Total Rjeldahl Nitrogen	=	60 mg/li
P.H.	=	6.5 –8.5 mg/li
Oil and Grease	=	50 mg/li
Temperature	=	18 -20°C
Ambient Air Temperature	=	18 -22°C

Without any mitigating measures, disposal of wastewater will cause a long-term deleterious effect on groundwater quality.

Another source of wastewater is the floor drains. Floor-drain wastes include routine floor washings and the occasional cleaning of spills. Normally, operating a mechanical equipment will generate some typical wastes, which are petroleum-based lubricants and fluids.

3.3.4 Solid Wastes

Solid wastes will normally be generated from the following: (1) material packaging and shipping, (2) office operations, and (3) routine maintenance. Packaging wastes are cardboard boxes and plastic

wrappings. Waste office papers are usually mixed waste paper and computer paper. Routine maintenance will generate rags used in cleaning and maintaining equipment. Used oil filters are also generated occasionally. At full occupancy, the proposed airport project can generate about 500-1000 kg/day of combined/mixed solid waste.

3.3.5 Fuel Storage Tanks/Pipelines

Pollution or contamination from the routine use of the fuel storage tanks and fuel pipeline are not expected during routine operations since these systems are designed not to release their contents to the ground. However, the possibility of leakage should not be discounted.

3.3.6 Air/Noise Pollution

Aircraft takeoff and landing, and movements of passenger and cargo vehicles to and from the airport complex, would affect the air quality and noise around the site. There would be a slight increase in ambient concentration of air pollutants in the area.

The project, with its attendant pollution control measures, will generate noise pollution at moderately significant levels only during takeoff and landing of planes.

3.3.7 Aesthetics

Introduction of the proposed project has a significant beneficial impact on the aesthetics. It will foster latest concepts and most appropriate technology in land planning and site development.

3.3.8 Increase in Population

The project will create both a permanent and transient population in the island. The permanent population will be about 67 workers who will be employed if they all come from the outside. If they will bring their families with them in the site with at least three (3) members, this will mean an average of 268 additional permanent population. The presence of the permanent population will statistically after population size and the composition of barangay population as well as household size, dependency ratio and educational attainment.

The transient population will be the airline passengers who will be using the airport. Their presence will intermittently alter population size and composition but not the long-term population characteristics of household size, dependency ratio and educational attainment. Permanent impact will be realized if the business opportunities generated by the airport

operation will invite in-migrants who will set up shops around the airport terminal.

3.3.9 Improvement of Basic Services

The basic services demand as road network will greatly increase during the operation phase of the project. The stretch between Tagbilaran City and the airport will take the heaviest toll.

3.3.10 Improvement of Health and Safety

With the improvement on lifestyle that can be catalyzed by the airport project, and the urbanization of the project area in general, the health and safety of the residents may subsequently improve. Because of development and economic capability of the residents, improvement on the basic utilities such as sanitized pipe drinking water, water-sealed septic tank and other basic health and sanitation facilities are expected to be effected in the project area.

3.3.11 Employment and Income

With the improvement on lifestyle that can be catalyzed by the airport project, and the urbanization of the project area in general, the health and safety of the residents may subsequently improve. Because of development and economic capability of the residents, improvement on the basic utilities such as sanitized pipe drinking water, water-sealed septic tank and other basic health and sanitation facilities are expected to be effected in the project area.

3.3.12 Land Use

It is expected that the values of the nearby areas will rise. In the near future, the domino effect of economic development that can be catalyzed by the proposed airport and other development projects in the project area may even felt not only in the immediate area of the project site but also in the nearby towns of Panglao.

3.3.13 Women

During the operation phase, the project offers work opportunities to women in the form of maintenance and security. This may move a number of housekeepers from the house to the work place. This has tremendous impact in terms of enabling women to earn their own money, ability to support their family and instilling a sense of efficacy.

3.3.14 Traffic

During operation phase, traffic in the area is expected to be insignificant. Flight schedules are expected not that crowded to create traffic in the road network.

3.4 MITIGATING MEASURES

3.4.1 Pre –Construction /Construction Phase

- *Soil Erosion*

Soil Erosion during rainy days of the construction periods is unavoidable. However, this can be controlled by the use of structural erosion prevention and sediment control practices, which will divert the storm sewer flows away from the exposed areas, prevent sediments from moving offsite, and reduce the erosive forces of runoff waters.

- *Dust Generation Control*

Common to most construction is dust generation, which persists only during the first few months of site development. It can easily be controlled by regular sprinkling the exposed areas with water. Strict implementation of dust control is necessary since the wide unobstructed air space of a flat landscape is favorable for dust transport. Spraying with used oil for dust control should not be allowed since it will contaminate the ground.

- *Noise Generation*

The disturbance caused by the noise pollution could be minimized by scheduling the arrival and departure of flights during the late morning and afternoons. Nearby residents who will most likely be affected by the airport operations and be exposed to its hazards could be relocated. A Noise Abatement Line or open space could be established and a green buffer zone could be created surrounding the airport and shielding the adjacent residential areas. Residential land use and their expansion could be planned outside of the delineated airport zone to minimize accidents and prevent noise pollution in the residential areas.

- *Greening of the Project Site to Improve Aesthetics*

  Careful grading and clearing of the site must be done, making sure that special features like hills are not graded down, removed or flattened, but rather preserved and even enhanced.

  Planting of grasses and trees, and other ornamental plants in open spaces intended for greening purposes is desirable. The purpose is to enhance the aesthetic appeal and as noise screens and wind barriers of the project area.

- *Resettlement*

  A detailed resettlement plan should be followed. The plan should address the issues, which are normally raised by the settlers but are overlooked by agencies undertaking the resettlement.

  The existing residents of the area should be given just compensation and the government must be able to provide them several options for the relocation of their individual or group settlements. These measures are necessary to prevent the dislocated families from becoming illegal settlers or squatters and to provide them better source of livelihood.

  Offer the farmers a good price for their land although it will be difficult to re-compensate them for the sentimental value of their land, which remains priceless. An information campaign would also be necessary to explain the benefits of the project to the landowners in the area. This is important step for the project to gain acceptance and support by the affected families and the general constituency.

- *Traffic Plan*

  Rerouting of the national highway and the creation of a new road become necessary. The national highway should be realigned with a safety spatial margin from the runway to avoid any untoward accidents, particularly runway overrun by aircraft.

- *Workers and Public Safety*

  In order to ensure the worker's safety during construction stage, the project proponent and its commissioned constructor must adhere to the Department of Labor and Employment Occupational Safety and Health Hazard Standards.

- *Local Labor Employment*

  Prioritization of local labor for employment will maximize the positive impact of the project. Priority in employment may be given to those households whose properties will be negatively affected by the project. The employment of any of their household members can be part of the compensation package.

3.4.2 *Operation Phase*

- *Wastewater*

  Accumulated oils and chemicals carried by surface runoff can be controlled by diverting the polluted waters into a retention pond. Sanitary wastes generated in the Sewage Treatment Plan (STP).

- *Solid Wastes*

  The airport management will employ the integrated solid waste management system by setting its solid waste management goals and objectives and then selecting and applying the suitable techniques, technologies, and management programs to achieve those goals and objectives.

- *Fuel Storage Tanks*

  Fuel storage tanks (FSTs) will be provided with appropriate technologies to prevent or minimize the risk of fires or explosions. The tanks will have at least the minimum required systems for leak detection, corrosion protection, and spill overfill prevention. Containment systems for releases from FSTs represent the second line of defense against the propagation in soil or groundwater contamination.

- *Oil-Water Separator*

  Oil and other non-miscible compounds in the runoffs can be removed efficiently using oil-water separators. A good example is the corrugated plate separator used in industrial facilities.

- *Control of Air Pollution*

  The most probable sources of air pollutant are cars and aircraft. From the point of view of regulation, these sources of air pollution are very difficult to control and regulate. The control is already beyond the authority of the airport management or the proponent.

In case of aircraft, the advents of new aircraft models whose efficiency of fuel burning is much better than the old one could help minimize the generation of air pollutants.

In case the airport project will install equipment or facilities, which are possible sources of air pollutants, all these facilities with emission sources will comply with the air quality standards.. Air pollution control devices will be installed

3.5 DATA GAPS AND LIMITATIONS OF THE ASSESSORS IN THE PREPARATION OF THE EIS

The EIS prepared for Panglao Airport was based on the feasibility study and advance engineering study conducted, and assessment of physical-chemical, biological, and social components of the environment. The Environmental Specialist conducted water sampling, which was submitted to a DENR-accredited laboratory. The biological component was also assessed through observation, utilization of secondary data and professional judgment. Air and Noise Assessment were conducted by CRL and SEASTEMS Inc. respectively. Geotechnical Investigation was conducted by AM Geoconsult Associates and Inspection (International) Inc. during the Feasibility Study and Advance Engineering stage respectively, while WATCON performed the Hydrological and Geo-Resistivity Survey. A sociologist was employed in perception survey and in the conduct of Scoping Sessions. Engineers, Economist, Financial Analyst, Airport and Transport Experts focused on the technical aspect of the project particularly design, cost/benefit and financial analyses, airport operation and management.

Limitation of the EIS Team falls on the following field of expertise:

1. Legal Officer capable of handling the legal aspect of the study - Panglao Island is covered by Proclamation No. 2152 which declared the whole island as a protected area.

2. Resettlement/Institutional Expert - About 50 families will be relocated. A detailed plan for resettlement must be prepared.

3. Geologist - Assessment and recommendation of a geologist is required based on the result of the Technical Scoping Session conducted on July 10, 2000.

Lastly, recommendations of experts in this study may no longer be feasible if implementation of the project will be deferred for a long period.

SECTION 4 The Project Setting

4.1 DECLARATION AND OBJECTIVE

The Department of Transportation and Communication (DOTC) is the lead department of the Government of the Philippines in the development of airport projects. By virtue of Department Order No. 96-964, the Air Transportation Office (ATO) has been designated as the responsible agency, not only for the efficient operation, maintenance, and planning of government airport facilities but also the construction and upgrading of new airports nationwide.

In this project, the Department of Transportation and Communication is the proponent or the Executing Agency in the implementation of the project. Overall coordination with other concerned government agencies shall also be the responsibility of the Executing Agency. Consultants are engaged for the design and construction phases of the project. Airport operation will be handled by DOTC-ATO

The development of the airport, in general, will expose the region to the international community, in terms of investment, tourism and technological advancement, greater potential and opportunity for a dynamic economy. This will allow to hasten the expansion of markets, and improve agricultural and industrial production; enable the efficient distribution of basic services to the mainstream, generate employment opportunities and dissuade rural-to-urban migration.

Economic benefits have been quantified as attributable to the development of the new airport. These are as follows:

- Land value of the existing airport
- Savings in the annual O&M of existing airport
- Value added from tourist expenditures
- Savings in passenger diversion cost

4.1.1 Land Value of the Existing Airport

Once the new airport is opened the existing airport will be abandoned and it is assumed that the property could be utilized for other purposes. The appraised value of the property given by realtors in Tagbilaran is at P1,500 per sq. m. net of taxes. Since the size of the property is about 220,000 sq.m. its economic value is placed at P330 million.

4.1.2 *Savings in Annual O&M of Existing Airport*

The existing airport has an allocation of P5.8 million for 2000. With the new airport, this amount will be saved.

4.1.3 *Value – Added from Tourist Spending*

The value – added that will effectively stay in Bohol for the first round of tourist spendings in the multiplier process will be the direct payments of salaries, wages and ancillary services of those involved in the local tourist industry. It is assumed, that at least 15% of tourist expenditures will be earned as value added.

4.1.4 *Savings in Passenger Diversion Costs*

Theoretically, the existing Tagbilaran Airport could handle over 100,000 passengers movements annually. However, Asian Spirit, the only airline providing commercial flights between Manila and Tagbilaran is hesitant to invest in the acquisition of additional aircrafts in the future to meet the demand due to the fear that if a new airport will be developed in Panglao it will lose the market on this route to other airlines operating larger aircrafts. The company is the only one left that operates domestic flights using 40 to 60 sitter aircrafts. It is currently employing a 40-seater turbo prop aircraft on its Manila-Tagbilaran flights. If the company by 2006 will be able to operate four daily return flights between Manila and Tagbilaran and at an average load factor of 75%, it will be able to handle only about 90,000 passengers annually. Compared to the air passenger forecast, an excess demand for 80,000 passengers will be created by 2006 and will progressively increase onwards. On the other hand, with the proposed airport there will be no problem accommodating the forecast passenger traffic. It is expected that the excess passenger demand will take the alternative route covering Manila-Cebu by air transport and then Cebu-Tagbilaran by fast craft. The diversion cost is estimated at P730 per passenger representing the boat fare plus transfer costs.

Looking into the microeconomics of the project, the following advantages are expected:

- ***Local Labor Employment***

  Local labor employment will be provided by the project both during construction and operation phases of the project. At the construction stage, about 500-700 skilled and unskilled workers will be directly

benefited from the project while about 67 airport personnel from Bohol will be employed in the airport operation.

- *Improvement of Health and Safety*

  The project will bring improvement on the basic utilities such as sanitized pipe drinking water, water-sealed septic tank and other basic health and sanitation facilities.

- *Work Opportunities for Women*

  The project will move number of housekeepers from the house to the workplace. This has tremendous impact in terms of enabling women to earn their own money and ability to support their family.

In terms of the environment, the project aims to generate significant beneficial impact on the aesthetics. It will foster latest concepts and most appropriate technology in land planning and site development.

4.2 THE NEED

The benefits of the proposed project against its adverse environmental consequences favors highly the implementation of the project. Utilizing an undeveloped agricultural area for this infrastructure enhances project's viability. not only in economic terms but also environmentally. More people will be benefited versus the number of families or groups that will be affected adversely by the project. The primary stakeholders identified are residents of Barangay Tawala, Bolod and partly of Danao. The Government of Bohol will take charge of their smooth relocation in the site intended for resettlement.

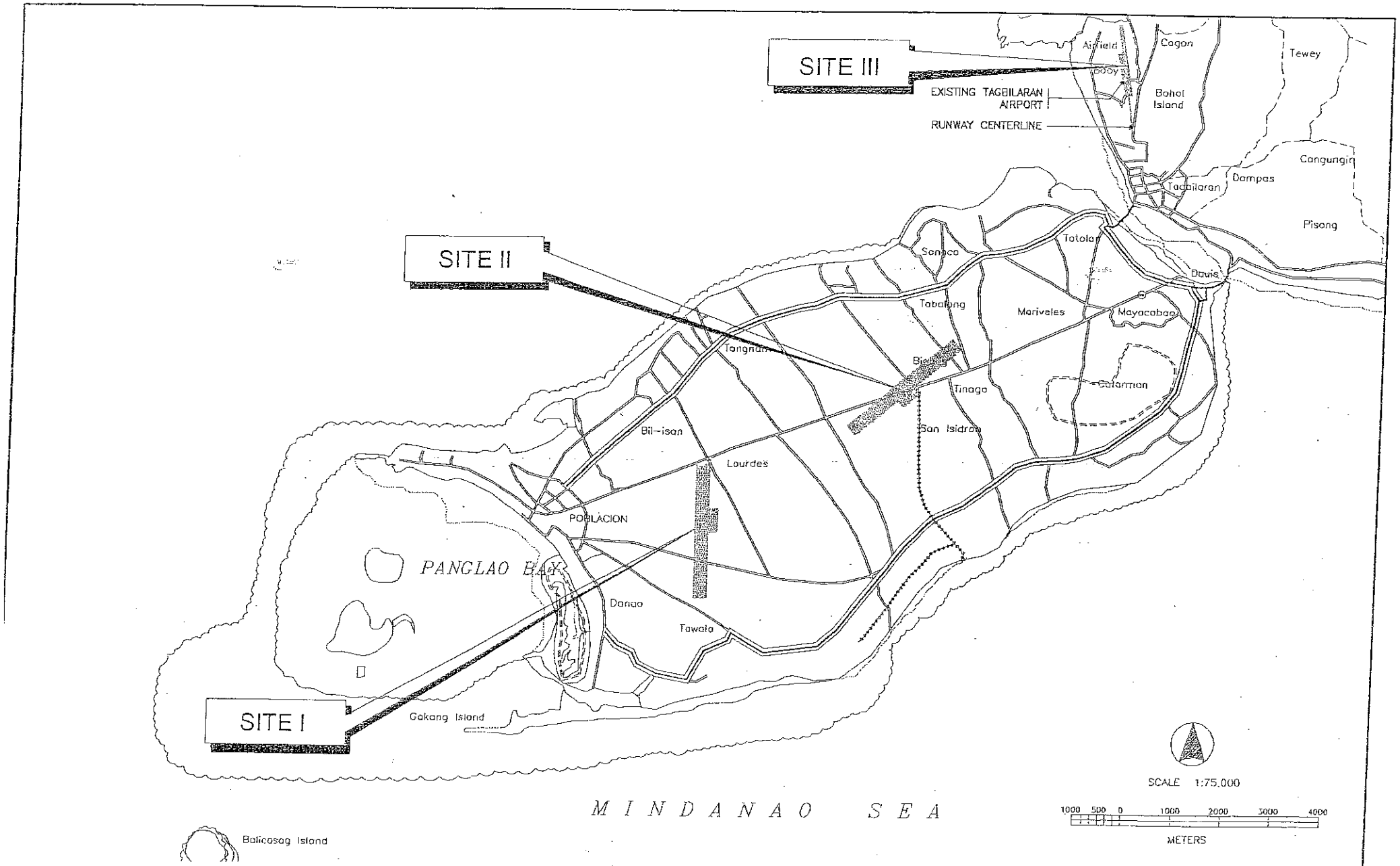
4.3 ALTERNATIVES

Selection of alternative sites needs consideration with the following specifications assumed for this particular project. Refer to **Figure 4 -1** Airport Three (3) Alternative Sites.

- The furthest perceivable domestic flight destination from Bohol will be Manila International Airport. The cruise distance from Bohol to Manila is 342 nautical miles. On this basis, a runway length of 2,000m at the start of the airport development phase is sufficient enough for any B737 model or equal aircraft equipment with 300m wide runway strips.

- The width of the runway is 45m with 7.5m shoulders on each side.

- The airport will be equipped with ILS and Precision Approach Lighting (PALS).



AIRPORT THREE (3) ALTERNATIVE SITES

FIGURE 4-1

With these airport dimensions, there are important factors to be considered in the evaluation of alternatives. These are as follows:

- Location
- Airspace
- Wind Coverage
- Airport Access
- Construction Considerations
- Environmental Considerations
- Economic Considerations

4.3.1 Locations

➢ *Site #1 Barangays Bolod, Tawala, and Danao Panglao Municipality*

The first alternative site for the proposed airport project is in Panglao town, which covers Barangay Tawala and portion of Barangays Bolod and Danao. It is 3 kilometers east of Panglao town and 15 kilometers southwest of Tagbilaran Airport.

The municipality of Panglao faces the Mindanao Sea and is connected to the main island of Bohol by two bridges. It is generally surrounded by the sea on the north, south and west.

➢ *Site #2 Barangays Tabalong, Tinago, and Bingag, Dauis Municipality*

The second proposed site is at Dauis municipality, which lies in three (3) barangays. These are Tabalong, Tinago and Bingag. Dauis is bounded by Mindanao Sea in the south, Bohol Strait in the north and the Municipality of Panglao to its west. It is three (3) kilometers away from Tagbilaran City, which is found in the eastern portion of the proposed site.

➢ *Site #3 Upgrade Existing Tagbilaran Airport*

Upgrading of the existing Tagbilaran Airport in Tagbilaran City is the third alternative for the project. The site is found in the southwest corner of the main island of Bohol, just across the smaller island of Panglao. Barangays covered are Cogon, Bo-oy, and Taluto.

Appendix V shows the Photographs of the three alternative sites and existing airport facilities.

4.3.2 Airspace

- *Site # 1 Barangays Bolod, Tawala, and Danao, Panglao Municipality*

  The approach/departure zones at both ends of the proposed runway have no obstruction. The proposed site is within the outer horizon of the surface of Tagbilaran Airport.

- *Site # 2 Barangays Tabalong, Tinago, and Bingag, Dauis Municipality*

  The NE approach/departure zone is toward Tagbilaran Airport and the SW is clear of any obstacle. At 2.5 km. East of proposed airport there is a presence of low hills in which may protrude the inner horizontal surface of the proposed airport. The proposed site is within the conical surface of Tagbilaran Airport.

- *Site # 3 Upgrade Existing Tagbilaran Airport*

  The straight-in approach to the Runway 35 has a 196m hill (190m above runway level) some 5,800 meters from the threshold, roughly at a 3.1% approach slope. The straight-in approach to Runway 17 has a mountain range with a maximum elevation of 502m. (493m. above runway level) located at a distance varying from 11,000 to 13,000 from the threshold, necessity permanent curved approach procedures.

4.3.3 Wind Coverage

- *Site # 1 Barangays Bolod, Tawala, and Danao, Panglao Municipality*

  The prevailing surface wind direction is Northeast (NE) based on the wind data of PAGASA Tagbilaran station for the period of 15 years from 1985 to 1989. Wind coverage is 99.79% and crosswind of 5 miles per hour. The proposed runway orientation is through north to ensure that the 40% land acquired will be within the proposed airport area.

- *Site # 2 Barangays Tabalong, Tinago, and Bingag, Dauis Municipality*

  The prevailing surface wind is northeast (NE) based on the wind data of PAGASA Tagbilaran station from 1985 to 1999. Wind coverage

is also 99.79% and crosswind of 5 miles per hour. The proposed runway orientation is Northeast (NE).

➢ *Site # 3 Upgrade Existing Tagbilaran Airport*

Above data is applicable in this alternative where PAGASA is located.

4.3.4 Airport Access

➢ *Site # 1 and Site # 2*

The municipalities of Dauis and Panglao are both situated in Panglao Island, which is a 9,000 hectares coralline island that belongs to the province of Bohol in the Central Visayas Region. The island is located at the southwestern side of Bohol and elongates along the northeasterly-southwesterly direction. It is separated from mainland Bohol by a shallow 600-m wide channel. Two bridges connect Panglao to mainland Bohol.

Main internal access in Panglao is provided by a paved spine road that longitudinally transverse the central portion of the island. The spine road connects to a circumferential road through a lateral road system.

➢ *Site # 3 Upgrade Existing Tagbilaran Airport*

National road is the only access road to Tagbilaran Airport. It is an 8m. wide road with fair to poor asphalt surfacing condition at the time of the site investigation. It normally takes about 5 to 10 minutes from the center of Tagbilaran City to the airport. Taxis and tricycles are the only public transportation available at the airport.

4.3.5 Construction Considerations

➢ *Site # 1 Barangays Bolod, Tawala, and Danao, Panglao Municipality*

- *Site Conditions*

Location : Tawala, Panglao, Bohol 3 kms. East of Panglao Town; 15 kms. Southwest of Tagbilaran

Geographical Coordinates: Longitude -123° 48' 45" N, Latitude - 09° 37' 30" E

Prevailing Wind: The observed prevailing wind surface direction on the time of ocular inspection March 30, 2000 NNE/NNW

Proposed Runway Orientation: The proposed runway orientation is thru North with the available strip of 400m x 2500m and the 200m x 400m. apron at the North end along the National Highway. At the south end is a provincial road.

Approach and Departure Zones: The north and south zones are cleared of any obstructions.

Transition Surfaces: The east and west transition surfaces are also cleared of any obstruction

Proposed Site: The proposed site is undeveloped lowland agricultural and with a few dwellers.

Proximity of Existing Airways: The site is not affected by the aircraft pattern of the Tagbilaran Airport.

Proximity of Water Transportation: Seaport at Tagbilaran City

Proximity of Land Transportation: Passenger buses and jeepneys are available from early morning to early evening.

Proximity of Hospital: Private and government hospitals are available at Tagbilaran City

Available utilities: At the locality, electric power is supplied by BOHECO II (Bohol Electric Cooperative II) and the telephone system is managed by ISLACOM.

- ***Site # 2 Barangays Tabalong, Tinago, and Bingag, Dauis Municipality***

Location: Tabalong, Dauis, Bohol is 3 kms. West of Dauis Town, 6 kms. WSW of Tagbilaran City.

Geographical Coordinates:

Longitude - 123° 48' 50." N
Latitude - 09° 37' 35"E

Prevailing Wind: The observed prevailing surface wind direction on the time of ocular inspection March 31, 2000 in NNE/NNW

Proposed Runway Orientation: The proposed orientation is N 10°W. At the north end is a coasted road while 2,000m (2 km.) toward south is the National Highway. The available area is approximately 75 hectares.

Approach and Departure Zone : The north zone is a sea and the south zone is free of any obstruction. The east and west transition surfaces also clear of any obstruction.

Proposed Site : Undeveloped lowland agricultural area with a very few dwellers.

Proximity of Existing Airways : The site is affected by the aircraft pattern of the Tagbilaran Airport.

Proximity of Water Transportation : The seaport in Tagbilaran City is 24-hours operation. It is about 3kms. away from the site.

Proximity of Land Transportation : Passenger buses and jeepneys are available within the area from early morning to early evening.

Private and Government Facilities : Emergency hospitals are available in Tagbilaran City.

Electric Power Supply : Electric power is supplied by BOHECO II (Bohol Electric Cooperative II) and the telephone system is managed by ISLACOM.

➢ *Site # 3 Upgrade Existing Tagbilaran Airport*

Location : Tagbilaran, Bohol is 2.5 km north of Tagbilaran City

Geographical Coordinates :

Longitude - 123° 51' 30"E
Latitude - 09° 39' 32" N

Runway :

- Airport Elevation – 11.52m. (38 ft.) AMSL
- Runway Designation Number – 17/35
- Runway Dimensions – 1,483m x 30m w/28m TA both ends
- Longitudinal Slope - 073°% uphill to the North
- Stopway RWY 17-0; RWY 35 -0
- Clearway – RWY 17 –64; RWY 35 -0

Proximity to transport, power and government facilities:

- These are found within Tagbilaran City

4.3.6 *Environmental Considerations*

For an airport development project, it normally requires to examine the following environmental impacts:

- Social environmental impacts related to settlement, economic activities, employment, traffic and public facilities, public health conditions, waste and hazards.

- Natural environmental impacts related to topography and geology, soil erosion, groundwater, hydrological situation, coastal zone, flora and fauna, meteorology, and landscape.

- Pollution including air pollution, water pollution, soil contamination, noise and vibration, land subsidence, and offensive odor.

It is assumed for the comparative study that reasonable environmental considerations will be made during the planning, design and construction of the airport, and that appropriate environmental protection measures, such as sewerage treatment, will be taken. Hence, only major environmental issues, which has considerable differences among the three (3) sites are described in the following sections:

➢ *Social Environment*

- *Site # 1 Barangays Bolod, Tawala and Danao Panglao Municipality*

Very little social impact is foreseen because of few inhabitants at and around the site. Diversion of existing road will be required to maintain smooth traffic circulation in the community.

- *Site # 2 Barangays Tabalong, Tinago, and Bingag, Dauis Municipality*

Very little social impact is foreseen because of few inhabitants at and around the site. Diversion of existing road will be required to maintain smooth traffic flow in the community.

- *Site # 3 Existing Tagbilaran Airport*

Significant social impact is expected in this site if the existing airport would be upgraded and again operated. The site is within the city crowded with commercial and industrial establishments. Hotels and medium density residential area are found along the National Road that runs along the vicinity of the airport. High-density residential areas are situated south of the airport. On the western side of the airport, there are establishments, which have a height of approximately 10 meters above runway elevation and will penetrate even the transitional surface associated with non-instrument Code Number 2 of the Runway approach.

The terminal area is located at the approach end of the Runway 35 at a distance of no more than 89m. from the runway centerline. Due to this location, further development of existing terminal area is not possible. The existing terminal building is marginally capable of handling present peak hour passenger count.

➢ *Natural Environment*

- *Site # 1 Barangays Bolod, Tawala and Danao, Panglao Municipality*

The site is predominantly agricultural and of rural character. Shrubs and grasses cover most of the space intended for the airport, hence the impact is considered insignificant to minimal only.

- *Site # 2 Barangays Tabalong, Tinago, and Bingag, Dauis Municipality*

The site is allocated to marginal agriculture and coconut plantation. Construction of the airport will affect some of the crops and coconut.

- *Site # 3 Existing Tagbilaran Airport*

Trees are also located very close to the runway end and will be an obstruction to the approach surface with a gradient of up to 4 percent.

The runway approaches at the existing Tagbilaran Airport are limited by terrain. The airport fence is located at the property line, for the major part at a distance of 50m. from the runway centerline.

➢ *Pollution*

Aircraft noise pollution could be the major adverse impact in the airport development.

- *Site # 1 and Site # 2*

As *sites #1 and #2* are for agricultural use with minimal inhabitants, air and noise pollution will have minimal impact in the area. Orientation of the airport selected should take into considerations major tourist spots in the island to minimize noise problem.

- *Site # 3 Existing Tagbilaran Airport*

Air and noise pollution caused by aircraft take-off and landing can directly affect the people in Tagbilaran City due to their proximity in the airport.

- *Economic Considerations*

The economics of the project plays a vital role in the selection of site for the project. These include cost of land acquisition for the airport, cost of land for resettlement, access road needed, and existing utilities/establishments to be affected.

Assessment shows that following findings:

- *Site # 1 and Site # 2*

Both sites are undeveloped low land agricultural area with few dwellers. Land value is low, hence cost of land for the airport is cheaper including cost for relocation.

In terms of filling materials, the project would incur less expense since the site is already flat suitable for the proposed development.

- *Site # 3 Existing Tagbilaran Airport*

In Tagbilaran City, the cost of lot is about P1,500 per square meter, which is costly compared to the above alternative. More families will be relocated due to noise impact during operation phase of the project. In addition, requirement of filling materials is quite high as assessed by civil engineers.

4.4 ASSOCIATED PROJECTS

The Panglao Industrial Estate cum Cyberpark (PIECP) will be developed in 96 hectares of land right beside the Panglao Airport. It consists of Area1, and Area 2 with identified areas of lots ranging from 500 square meters to a maximum area of 4,099 square meters allowing the optimum flexibility among prospective locators.

Development of the Panglao Circumferential Road and the twin causeways connecting the island to Mainland Bohol is being fast tracked along with the expansion of the Tagbilaran Seaport.

Power and water supply to the island will be most reliable with the scheduled completion of the Tagbilaran-Bohol-Leyte interconnection project and the implementation of the Tagbilaran Water Supply Master Plan.

SECTION 5 The Proposal

5.1 GENERAL

There could have been other possible airport sites in the main island of Bohol. However, the island is mountainous and the natural topography would project into the airspace that is within the obstacle limitation surface.

Panglao Island is found suitable for the proposed project and its two (2) municipalities; Dauis and Panglao had been the focus of evaluation for the relocation of the existing Tagbilaran Airport. Dauis and Panglao share some common characteristics as noted in the discussion made in Section 4.3 of this report.

This chapter reiterated the similar and distinct features of the three (3) alternatives as tabulated in **Table 5.1**.

Table 5.1 - Alternative Sites Evaluation

	Factors	Site 1	Site 2	Site 3
1	Location	Barangays Bolod, Tawala & Danao, Panglao Island	Barangays Tabalong, Tinago and Bingag	Upgrading of Tagbilaran Airport Tagbilaran City Brgys. covered are Cogon, Bo-oy and Taluto
2	Topography	Relatively Flat	Limited space and undulated in the northern part	Relatively Flat
3	Land Use	Undeveloped low land agricultural and with a few dwellers	Undeveloped low land agricultural area with a very few dwellers	Surrounding area is urbanized High -density residential area is situated south of the airport
4	Probability of Flooding	Low	Low	Low
5	Population density at site	Low	Low	High

Table 5.1 - Alternative Sites Evaluation *(continuation)*

	Factors	Site 1	Site 2	Site 3
6	Accessibility: Distance from City, and traffic condition	15 km relatively low traffic	8km relatively low traffic	3km Heavy traffic, road passes through densely populated areas or city proper
7	Travel time from the City	20 – 30 min.	15 –20 min.	3 – 5 min.
8	Air Space	Good	Good	Limited
9	Runway	Follows the prevailing wind		
10	Aircraft Noise impacts	Low	Low	High
11	Existing utilities to be affected - Road - Power line	to be diverted -	to be diverted to be diverted	to be diverted -
12	Filling materials needed	Low		High

Survey showed that Panglao site has distinct advantages over Dauis. There had been several studies made in the past (tourism estate, environmental studies, airport study) and the local residents are already more aware of the project benefits and their possible livelihood opportunities. (as shown in **Appendix XIII** - Perception Survey Results). The area required for the airport project has already been acquired in Panglao whereas no acquisition has been made in Dauis for this project.

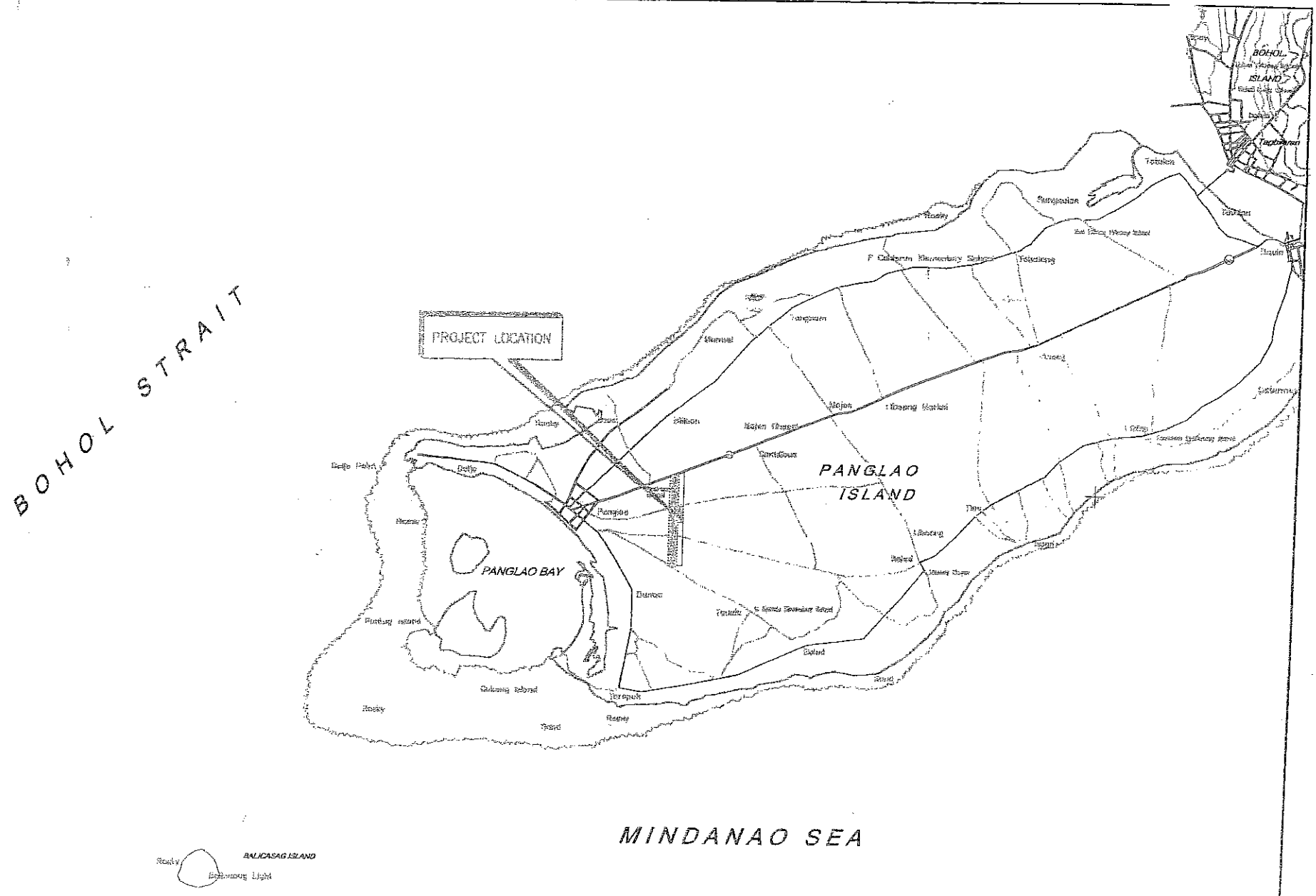
5.2 GENERAL LAYOUT

The project site is located in Barangay Tawala, including portions of Barangay Bolod and Danao, Municipality of Panglao in Panglao Island. The project lies between 9°33' and 9°36' east latitude and 123° 46' and 123° 48' 45" north longitude. The terrain is generally level with an average elevation of 10 meters above mean sea level. The site is free from natural obstructions along the approach and take-off areas.

Location Map is shown in **Figure 5 –1.**

5.3 PRE –CONSTRUCTION DETAILS

Pre-construction and construction details are combined in one work plan. Description of activities and the corresponding schedule are reflected in **Table 5.2**, Project Implementation Schedule.



LOCATION MAP

FIGURE 5-1

It is expected that after concluding the loan agreement in March 2001, Engineering Design and Contract Documentation together with pre-qualification of Contractors will be made and completed in the year 2002. In the first month of the year 2003, the Contractor will be selected and the Construction works will be started. It can be expected that the construction works will be substantially completed in two and half (2 ½) year.

5.3.1 Major Construction Activities

- *Earthworks*

  Excavation (cut) of the proposed Panglao Airport shall be made to the south side where elevation of 14+ were surveyed, bringing the excavated materials to the north. This northern side of the airport needs the excavated materials to bring its elevation to the required design levels. Approximately 575,000 cubic meter of earth will be excavated and use as filling materials. The additional filling materials of 282,700 cubic meters are available on barangays Dao and Mariveles located 2.5 km and 5.0 km respectively from the site. Rough roads connect these barangays to the project site.

- *Drainage Works*

  Surface runoffs on the airside will be collected by Trapezoidal Lined Ditch along the perimeter fence and conveyed to a retention pond. The flow of the excess volume from the pond is then controlled through a smaller conduit where it flows into the cross culvert of the existing road. This activity can start immediately after earthwork is completed and can be done simultaneously with other works.

  Traditional Reinforced Concrete Pipe Culverts, Gutter Inlets and Surface Inlets will be used to collect surface water from the buildings, roads and parking and conveyed to the Trapezoidal Lined Ditch. Again, this activity can be done simultaneously with other items of work.

- *Pavement Works*

  The Runway, Taxiway, and Apron require large quantities of concrete and asphalt and could affect the construction program significantly. Sufficient amount of aggregate, cement, and asphalt should be on hand once construction starts. A 30 mm/hr capacity concrete batching plant and four transit mixers are the minimum requirement for concreting operation, while a 60 tons/hour asphalt batch plant is required for asphalting of the runway and taxiway.

TABLE 5.2 PROJECT IMPLEMENTATION SCHEDULE

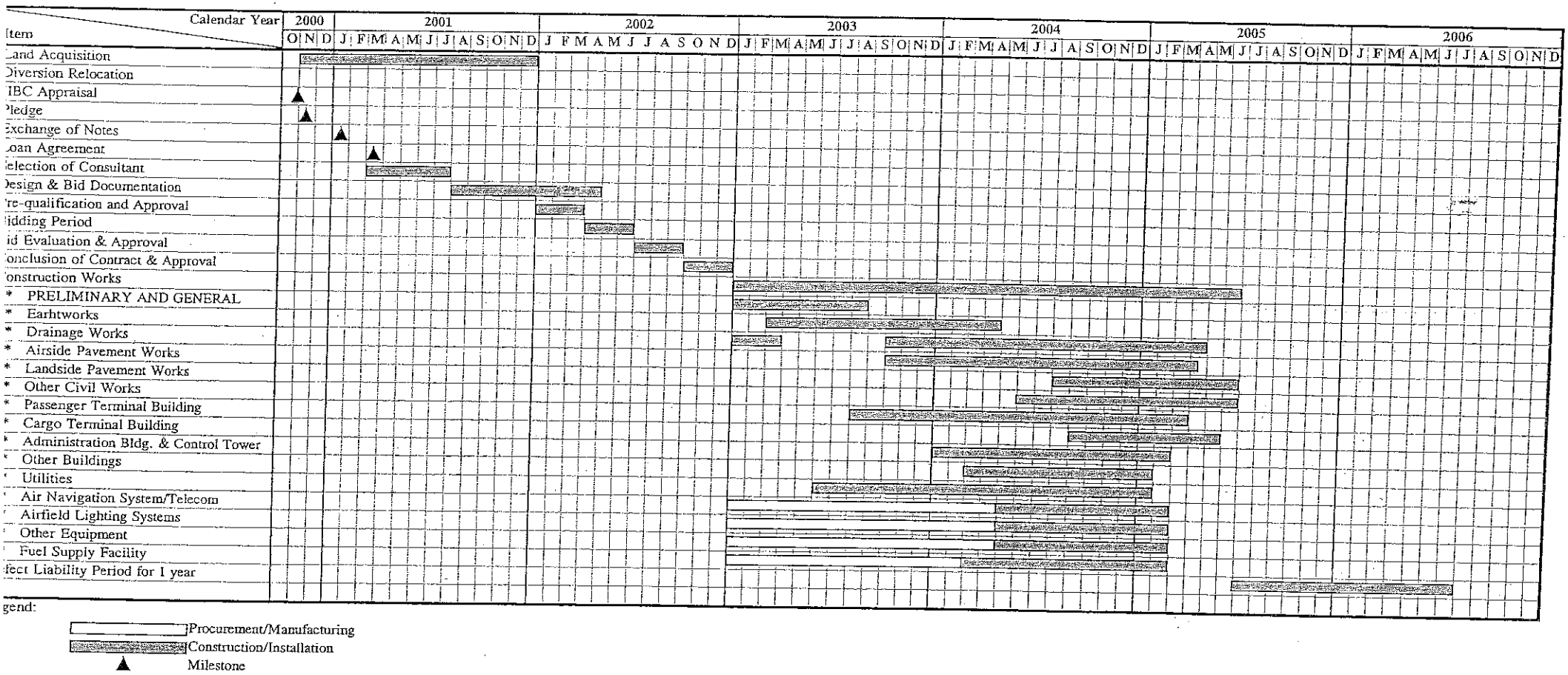


Table 5.2 Shows the project implementation schedule, which would be applicable if the financial assistance from a foreign country is sought for both the design and construction of the project at once.

➢ *Building Works*

Constructions of Building Works are composed of Passenger Terminal, Cargo Terminal, Power House, Pumphouse, and ATC/ARFF Buildings with a total construction period of 20 months. Total floor areas of each building are as follows:

		Floor Area (m^2)
a. Passenger Terminal	-	4050.00
b. Cargo Terminal	-	956.25
c. Power House	-	369.75
d. Pump House/Reservoir	-	215.07
e. ATC/ARFF	-	1,144

➢ *Airport Utilities*

Power, Water, and Telephone should be coordinated and installed in coordination with the involved utility franchise holder. At this point, advance planning is necessary especially the items that will be buried underground, i.e., pipes.

5.3.2 *Temporary Road Plan*

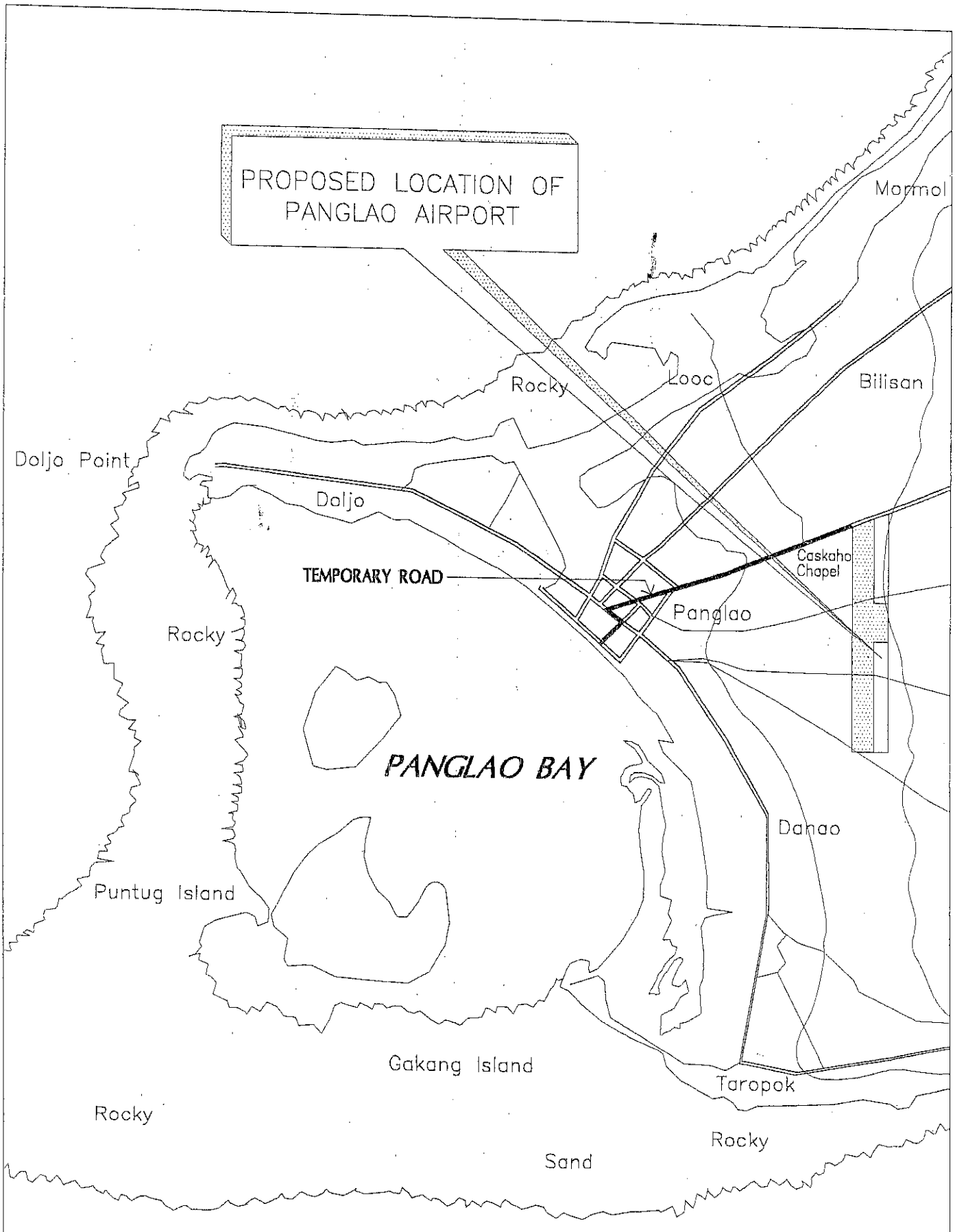
The equipment and materials will be mobilized and delivered respectively to the site through the existing road. See **Figure 5 –2**, Temporary Road Plan.

➢ *Access Road*

The new access road will be of Concrete Pavement and will have a four-lane road, with two-lane on both direction and a 2.2-meter median separator (Center Island) along its stretch, 14.00 meter of which shall be the carriageway.

The project site is accessible to a road starting from the main central highway/Tawala junction, running through barangay Bolod and Tawala in Panglao.

The road network serves as feeder road from the main highway to the residential areas.



PANGLAO AIRPORT PANGLAO, BOHOL	FIGURE 5-2 TEMPORARY ROAD PLAN

The list below shows the suggested contents of an Airport Operations Manual:

a) Introduction and distribution of copies of the manual, etc.
b) Technical Administration: Identification, Opening Hours, Runway Length, etc.
c) Aerodrome Characteristics: Airport Layout, Lighting, etc.
d) Ground Procedures
e) Rescue and Fire Fighting Plan
f) Meteorological Services
g) Communication and Navaids
h) Signal and Markings
i) Passenger Terminal
j) Cargo Handling Terminal
k) General Aviation
l) Aerodrome Emergency Plan including Crisis Control
m) Facility/Equipment of Operations/Maintenance Procedures

The airport management is responsible for designing and issuing an airport operations manual pertaining to the needs and condition of the airport. The manual may be reviewed for possible amendment, modification or change to suit airport needs and requirements. Underscore important facts and information in the manual. Part of the details contained in the manual include the following:

a) Crash Fire and Rescue Procedure
b) Security Procedure
c) Inspection and Maintenance Procedures to ensure safe access to the runway and taxiway systems.
d) Procedures to Ensure Order and Safety at the airside
e) Procedures to Ensure Security and Convenience at the air terminal
f) Other Pertinent Maintenance Procedure

5.4.3 Noise, wastes, emission, effluents to be emitted and disposed of

➢ *Liquid Wastes*

Effluent from the Sewage Treatment Plant is discharged into the drainage system that contain nitrate, metals, bacteria, and viruses. These materials may have deleterious effects on the groundwater quality. The greatest concentrations of dissolved nitrates in deep groundwater zones are usually located beneath the densely populated urban areas. The effluent could migrate downward especially in

areas of intensive groundwater pumping and declining groundwater levels.

Another source of wastewater is the floor drains. Floor-drain wastes include routine floor washings and the occasional cleaning of spills. Normally, operating a mechanical equipment will generate some typical wastes, which are petroleum-based lubricants and fluids.

- *Solid Wastes*

Solid wastes will normally be generated from the following: (1) material packaging and shipping, (2) office operations, and (3) routine maintenance. Packaging wastes are cardboard boxes and plastic wrappings. Waste office papers are usually mixed waste paper and computer paper. Routine maintenance will generate rags used in cleaning and maintaining equipment. Used oil filters are also generated occasionally.

Improper management of solid waste may also cause air and water pollution. Burning of solid wastes in the open will generate some gaseous and particulate matter causing air pollution problems. Leachates could contaminate the groundwater, while runoffs from open dumps will pollute surface water.

- *Leaks from Fuel Storage Tanks/Pipelines*

Possibility of pollution or contamination from the routine use of the fuel storage tanks and fuel pipeline should not be discounted.

- *Air /Noise Pollution*

Aircraft takeoff and landing movements of passenger and cargo vehicles to and from the airport complex will generate air and noise pollution.

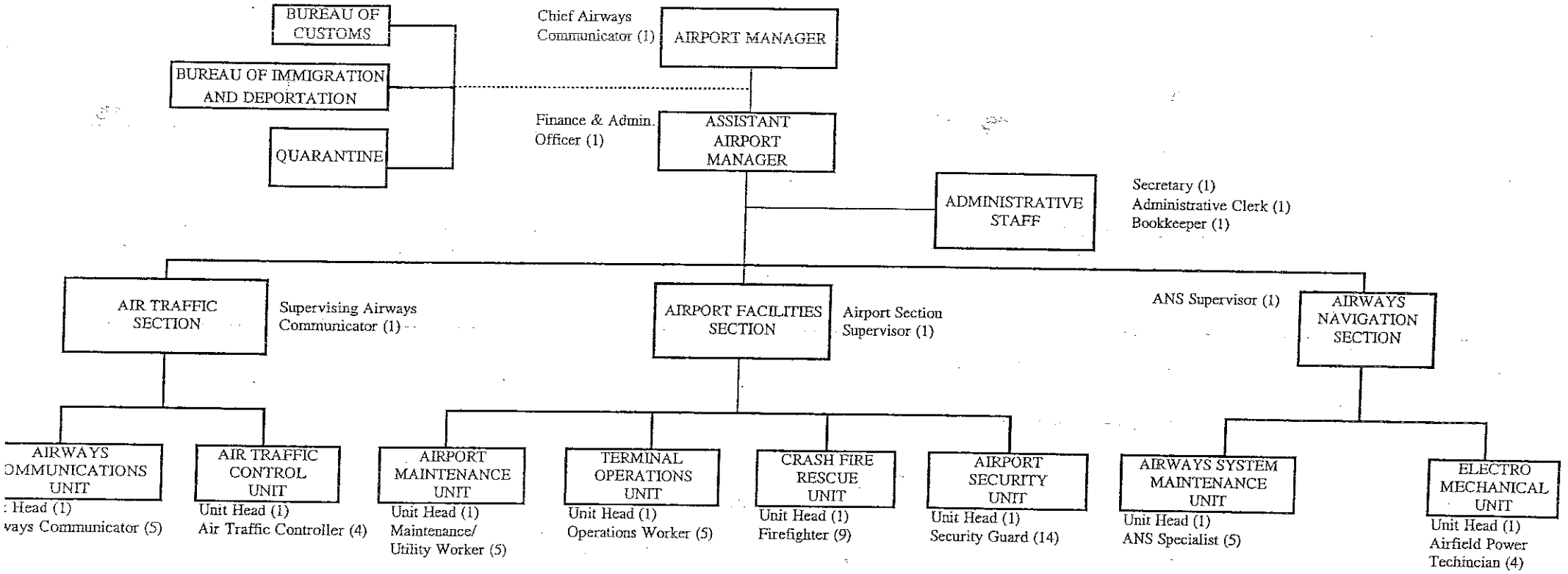
See **Appendix X**, Noise Modeling Results.

5.4.4 Manpower and equipment requirement

Sixty seven (67) manpower is required to operate the airport as reflected in **Figure 5 –3**, Organizational Set-up of the Airport Personnel.

In terms of equipment requirement, generator, air-conditioning unit, airport accessories e.g. radio navigation aids, communication equipment, mowers, tractors, truck, welding machine and friction test device are needed in the operation of the airport.

PROPOSED PANGLAO AIRPORT
ORGANIZATIONAL CHART



Total Manpower Complement = 67

FIGURE 5 - 3

5.4.5 *Expected project size and scale*

The project will occupy 170 hectare area. It can accommodate three (3) B737 and one (1) A300 planes not considering future expansions. Based on traffic forecasts, the total number of passengers to be serviced per day by the airport will be 1,600 in the year 2015 and about 2,050 passengers in the year 2020.

5.4.6 *Technical and operation procedures including flow diagrams, timing schedules and inspection*

The Passenger Terminal Facilities will mainly be used of the traveling public and be the heart of the terminal area. The Cargo Terminal Facilities will mainly be used by the Airlines and Cargo forwarders/agents. The Airport Operations facilities will mainly be used by the ATO. Legal operations of airports are governed by national regulation and instructions embodied in ICAO standards, recommended measures and manuals. Basic instructions have to be modified and amended to adapt to the new situation at the new airport.

Management is responsible for issuing and publishing local regulations and instructions and monitoring compliance. The scope and level of procedures can vary from one airport to another depending on the size, number of employees, number of airlines, type of traffic, and related factors. These procedures will be introduced at this airport project.

Figure 5 –4 shows the passenger and baggage flow in the airport.

5.4.7 *Maintenance under normal conditions - type of expected maintenance, predicted maintenance problems and plans for any partial or complete shutdown associated with maintenance problems*

An airport must conform to technical and safety standards, which is achievable through proper and consistent maintenance of all assets/elements of the airport.

Maintenance includes checking and evaluating the present status of an element to keep or restore its operational function or prolong its life span. The process involved are (a) inspection as per checklist, (b) periodical servicing and overhaul,, and (c) repair. Inspection covers checking and evaluating the asset, done either spontaneously or periodically, while servicing, overhaul or repair is intended to maintain or return facility or device to its required normal operating condition.

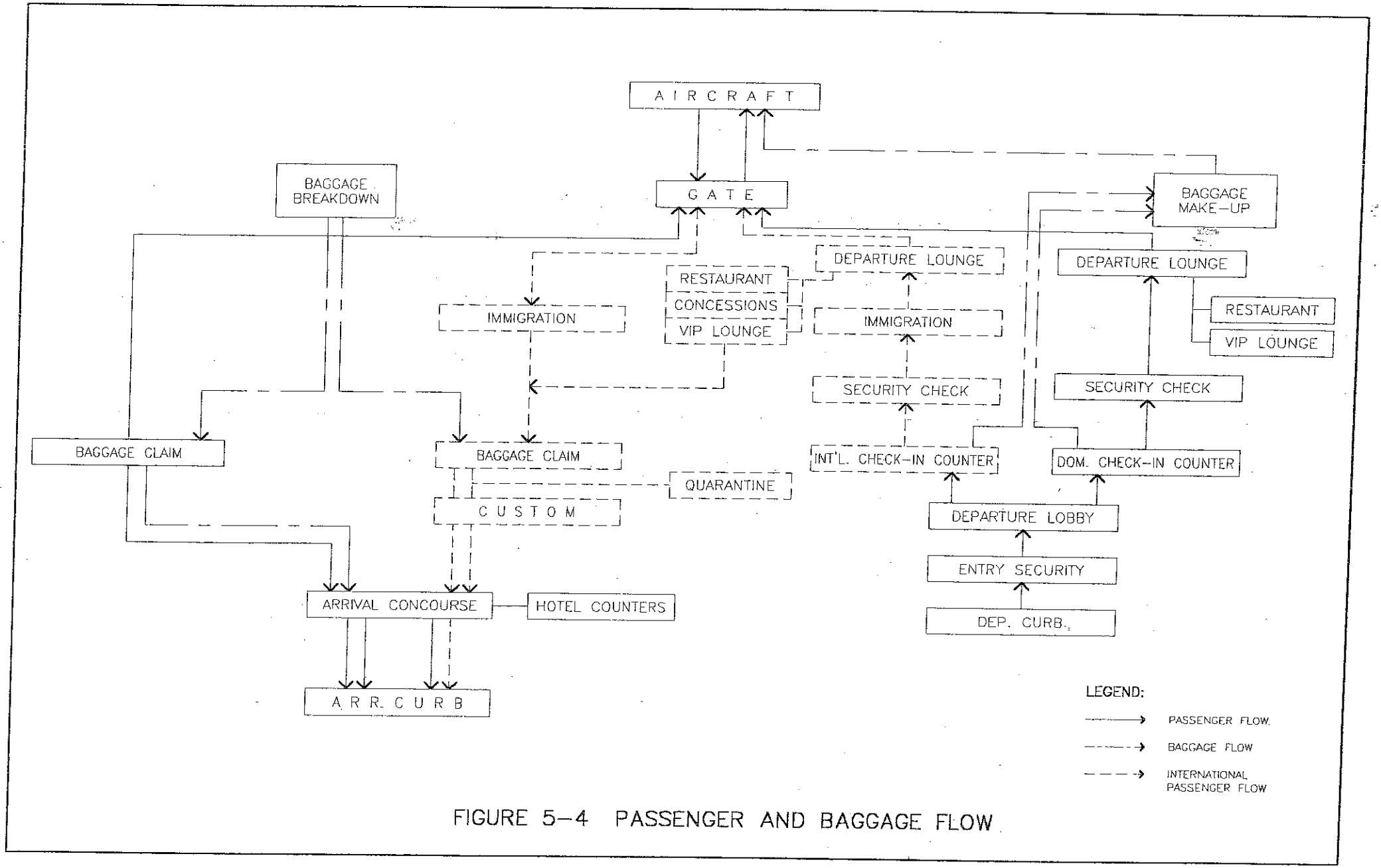


FIGURE 5-4 PASSENGER AND BAGGAGE FLOW

Maintenance plan includes (a) specifying the time, (b) classifying the nature of the service , (c) estimating the costs involved, and (d) complying with required mandates as prescribed by the Commission on Audit. The above-mentioned maintenance procedures include buildings, pavement sections and unpaved areas, Navaids, equipment and vehicles.

Maintenance covers not only applying remedial measures but also likewise installing preventive mechanisms when the facility or equipment's status or condition is still recoverable. The nature of the maintenance plan depends on the expanse of the airport, population of the objects and the complexity of the equipment facility to be covered.

5.4.8 Number of jobs available to local residents and from the outside by occupation

About 67 jobs will be available to both local residents and from the outside by occupation. Based on positions and qualifications required in the proposed airport, about 25 permanent positions could be provided to residents of Panglao. Educational attainment required for Security Guard, and Airport Maintenance Workers is only high school graduate. Trainings could be provided if needed.

5.5. CONTINGENCY PLANS

In the presence of any undesirable situation related to environmental disaster, emergency preparedness is therefore important. It is necessary that the proposed airport project formulated contingency plans for dealing with emergencies and should be made available to the administrator of the airport. At any event that the airport facilities accidentally disposed of extremely hazardous substances, the Environmental Officer must:

1. Notify the DENR (required by RA 6969)
2. Submit plans on containment, decontamination, and disposal
3. Immediately issue notification of any release

Each incident involving the release of hazardous substance presents special problems. Response personnel must evaluate these problems and determine an effective course of action to mitigate the incident. The following phases are involved in safely responding to an incident: (1) site assessment, (2) site entry, and (3) site control.

Site assessment will include an evaluation for site approach to keep emergency control personnel out of the hazardous area until identification of the nature and degree of the hazards can be made and initial assessment completed. Important requirement in site entry are personal protective equipment and monitoring. The

preliminary safety requirements will be based on the findings of the initial on-site survey and reconnaissance, which may consist of more than one entry. Each situation will be examined individually since no method can select a level of protection in all unknown environments.

Control of the site is necessary to reduce the possibility of exposure to any contaminants present and contaminant transport by personnel or equipment. This may include the setting up of security and physical barriers to exclude unnecessary personnel from the general area and establishing control points to regulate access to work zones. Movement of personnel and equipment between zones and into the site will be limited by these control points.

5.6 ABANDONMENT

The Panglao Airport, which will replace the existing Tagbilaran Airport, will be used for a very long time to cope with regional aviation demands, and the new airport site was selected to satisfy the requirement. Therefore, it is unlikely that the new Panglao Airport will be abandoned in the near future. In the remote chance that the airport operation is not sustained, the airport can be converted into parks or residential subdivision.

SECTION 6

A Brief History of Past Environmental Conditions and a Description of the Existing Environment and Resource Use

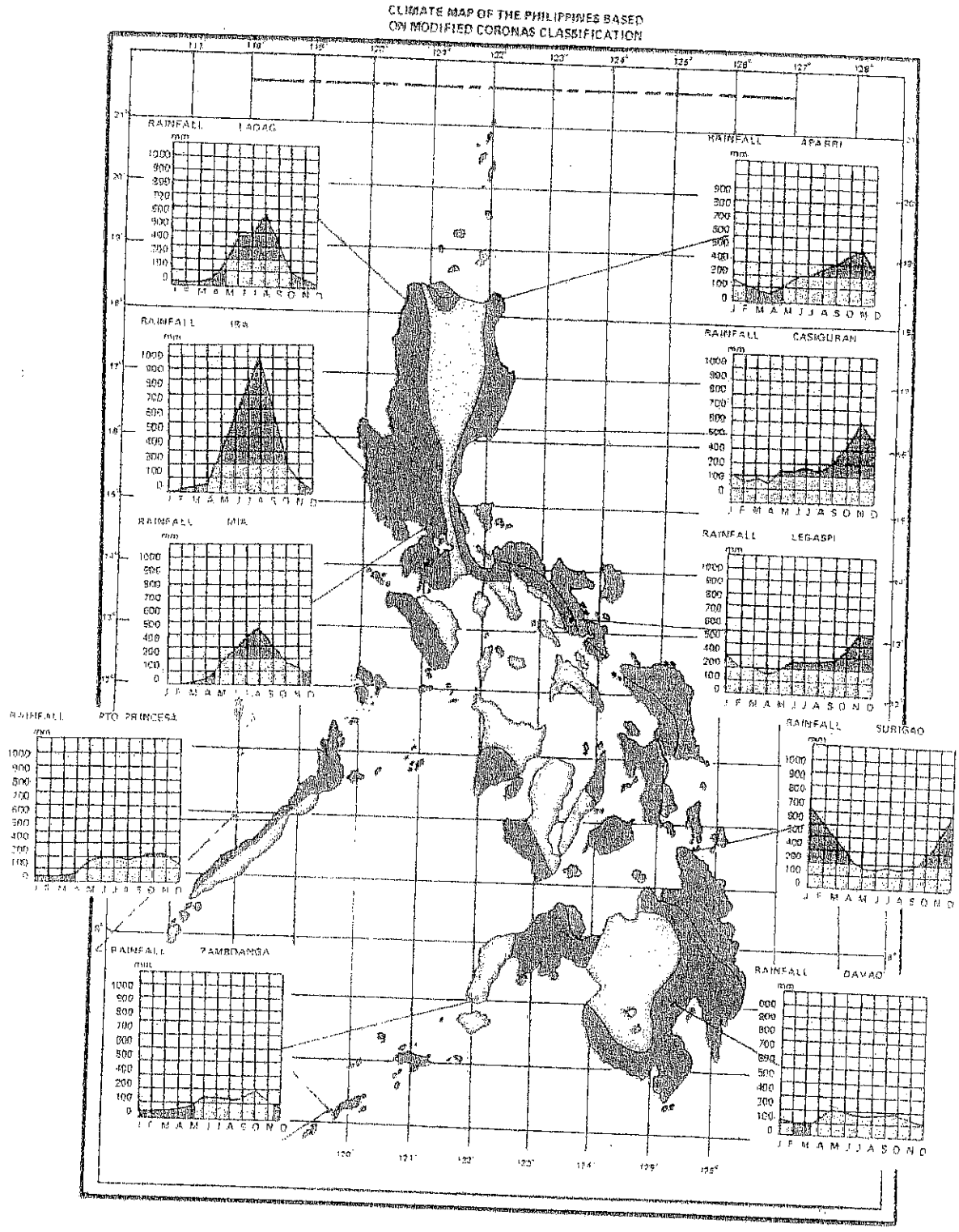
6.1 CLIMATE

The project area is located within the central part of the Visayas and is classified as Type IV under the modified coronas climate classification (**Figure 6 -1**). This type of climate is characterized by rainfall, which is more or less evenly distributed throughout the year. Although rain can be expected in any month, the maximum rain period is from September to November when the area is exposed to rainfall brought by the prevalence of the northeast monsoon as well as the southward migration of the Inter-tropical Convergence Zone (ITCZ) from its northernmost position during the southwest monsoon. Rain associated with the passage of tropical cyclones within or near the area is also a source of its annual rainfall. The nearest PAGASA station is at Tagbilaran, Bohol that can provide data that can represent the climatological normal of the project area. Aside from the Tagbilaran station, two other existing PAGASA synoptic stations, i.e. Mactan station in Cebu and Dumaguete, Negros Oriental, were considered in the climatological analysis. The climatological normal from these synoptic stations are presented in **Tables 6.1** to **6.3.**

Table 6.1
Climatological Normals at Tagbilaran, Bohol (1961-1995)

Month	Rain	RD*	Temperature °C			RH**	Wind	
	(mm)	No.	Max.	Min.	Mean	%	Dir.	Sp.
Jan.	103	14	30.7	21.8	26.3	82	NE	2
Feb.	69	11	31.1	21.7	26.4	82	NE	2
Mar	70	10	31.9	21.9	26.9	79	NE	2
Apr	65	8	33.0	22.8	27.9	78	NE	2
May	76	9	33.3	23.8	28.5	79	NE	1
Jun	122	15	32.7	23.9	28.3	81	S	1
Jul	119	14	32.4	23.8	28.1	81	S	2
Aug	109	13	32.8	24.1	28.4	80	SW	2
Sept	130	14	32.6	23.9	28.2	81	SW	2
Oct	172	18	32.2	23.5	27.8	84	NE	1
Nov	183	18	31.9	23.0	27.4	85	NE	1
Dec	118	16	31.3	22.4	26.9	84	NE	2
Annual	1336	160	32.3	23.0	27.6	81	NE	2

Source: PAGASA - Climatological Normals, Tagbilaran City Stations



CLIMATE MAP OF THE PHILIPPINES

FIGURE 6-1

Table 6.2
Climatological Normals at Dumaguete City, Negros Oriental (1961 – 1995)

Month	Rain	RD*	Temperature °C			RH**	Wind	
	(mm)	No.	Max.	Min.	Mean	%	Dir.	Sp.
Jan.	78	13	29.4	24.2	26.8	81	NE	3
Feb.	52	9	29.5	24.1	26.8	81	NE	2
Mar	45	7	30.5	24.5	27.5	79	NE	2
Apr	41	5	31.7	25.3	28.5	77	NE	2
May	66	8	32.4	25.4	28.9	77	NE	1
Jun	108	13	32.2	24.7	28.5	78	NE	1
Jul	118	14	31.9	24.2	28.0	80	SW	2
Aug	106	14	32.2	24.2	28.2	79	SW	2
Sept	137	14	32.0	24.2	28.1	79	NE	1
Oct	158	16	31.6	24.3	27.9	80	NE	2
Nov	135	14	31.0	24.6	27.8	80	NE	2
Dec	97	14	30.2	24.5	26.4	81	NE	2
Annual	1142	141	31.2	24.5	27.9	79	NE	2

Source: PAGASA – Climatological Normals, Dumaguete City Station

Table 6.3
Climatological Normals at Mactan, Cebu (1961 – 1995)

Month	Rain	RD*	Temperature °C			RH**	Wind	
	(mm)	No.	Max.	Min.	Mean	%	Dir.	Sp.
Jan.	104	10	29.8	23.8	26.8	81	NE	3
Feb.	68	8	30.2	23.8	27.0	79	NE	3
Mar	56	7	31.1	24.4	27.7	77	NE	3
Apr	43	5	32.2	25.4	28.8	75	NE	3
May	72	6	32.9	25.9	29.4	76	NE	2
Jun	182	14	32.1	25.3	28.7	79	SW	2
Jul	192	15	31.6	24.9	28.2	80	SW	2
Aug	146	12	31.8	25.1	28.4	78	SW	3
Sept	177	15	31.8	24.9	28.3	80	SW	2
Oct	183	15	31.4	24.7	28.1	81	NE	2
Nov	149	12	31.0	24.7	27.9	81	NE	2
Dec	131	12	30.2	24.2	27.2	81	NE	3
Annual	1504	131	31.3	24.8	29.0	79	NE	3

*RD - Rainy Days
**RH – Relative Humidity
Source: PAGASA – Climatological Normals, Mactan Station

➢ *Rainfall*

The monthly climatological normals, represented by the Tagbilaran Synoptic Station (See **Table 6.1**) shows the months of September, October and November have the highest rainfall values. November

has the maximum amount at 183 millimeters (mm), while September and October has 130 mm and 172 mm, respectively. Relatively dry period covers February to May with minimum rainfall occurring in April (65mm). The total annual rainfall is 1336 millimeters. The annual total number of rainy days is 160 with October and November having the most rain occurrence with an average of 18 days each. April and May have the least number of rainy days, eight and nine respectively.

The highest amount of daily rainfall ever recorded in the area was 205mm, which occurred on January 14, 1986 (**Table 6.4**).

Table 6.4 - Climatological Extremes at Mactan, Cebu (1961 – 1995)

Month	Temperature °C				Greatest Daily Rainfall (mm)		Highest Wind (mps)	
	High	Date	Low	Date	Amount	Date	Sp. Dir.	Date
Jan.	35.0	29/88	17.1	23/65	205.0	14/86	16 NE	8/86
Feb.	35.2	27/83	16.2	24/73	72.4	10/12	16 N	1/93
Mar	36.4	28/81	16.6	11/61	96.4	20/7	22 NNE	20/89
Apr	36.7	9/86	17.8	2/67	115.5	28/74	20 NNE	18/83
May	36.7	21/92	20.0	4/63	133.9	24/94	20 SW	19/82
Jun	36.8	4/92	20.6	25/71	165.7	1/95	22 S	29/85
Jul	36.2	15/63	19.6	16/95	124.8	17/21	25 ESE	28/85
Aug	37.1	31/92	20.6	29/72	106.6	9/91	16 SW	3/86
Sept	37.2	4/92	20.2	7/84	127.5	23/9	29 SW	2/84
Oct	36.1	19/69	19.9	31/20	166.2	12/13	20 SSW	20/71
Nov	35.5	16/62	18.7	29/29	166.4	12/90	36 SSE	19/68
Dec	35.0	18/63	17.4	5/60	107.7	3/72	21 NW	25/86
Annual	37.2	4/9/92	16.2	24/2/73	205.0	14/1/86	36 SSE	19/11/68
Period of Record	1903 to 1996				1903 to 1996		1966 to 1996	

Source: PAGASA – Climatological Normals, Mactan Station

➢ *Wind Speed and Direction*

The monthly normal wind speed affecting the project site ranges from only one to two meters per second (mps) with an annual normal of 2 mps. Wind direction is from NE (October to May of the following year) to SW. Wind speed of 2 mps can be experienced in the months of January to April while other months such as May and June have relatively calm winds (at 1 mps) on the other hand, recorded monthly climatological extremes show that observed wind speeds equal to or more than 16 mps can be found in all months. The highest ever-recorded wind speed was 36 meters mps (from the SSE direction) on November 19, 1968 (see **Table 6.4**).

➢ *Temperature*

The monthly temperature for the period 1961 to 1995 is 27.6°C. The relatively coldest month is February with 21.7°C while the warmest month is May with 33.3°C. Monthly mean temperature variation does not show large difference between months. Based on the occurrence in the area were 16.2°C on February 24, 1973 while the recorded highest temperature of 37.2°C occurred on September 4, 1992 (see **Table 6.4**).

➢ *Relative Humidity*

Based on the 35-year climatological record (1961 – 1995), the average annual relative humidity (RH) is 81%, ranging from 78% in April to 85% in November. The months of October to December have the highest monthly relative humidity (RH), which is equal to or greater than 84%.

➢ *Tropical Cyclone*

On the average, there are about 20 tropical cyclones per year that enter the Philippine Area of Responsibility (PAR) out of 36 tropical cyclones observed each year in the Northwest Pacific. Nine out the twenty tropical cyclones cross the country per year for the period 1948 – 1994. Tropical cyclone crosses the country per year for the period 1948-1994. Tropical cyclone normally passes or affects the project site from January to April including December although there is a possibility of tropical cyclone occurrence during other months. During the eleven-year period, Bohol has been under Public Storm Signal No. 3 (tropical storm or typhoon affects the area) for only 10 times which is relatively less compared with Mactan and Dumaguete.

➢ *Storm Surge*

Based on sparse data from the PAGASA, the first and only occurrence of a storm surge in the island of Bohol, specifically in Mabini, was recorded in 1934. Detailed report is not available on the storm surge occurrence as well as on its damage.

6.2 TERRAIN

6.2.1 Physiography and Topography

The nature of the rock units and the geotechnic history of Panglao Island influence the island's physiography. The morphology of Panglao Island resembles a low plateau with its almost flat central topography. (**Figure 6**

–2 showed the topographic map of Panglao Island).

The terrain of the proposed site is generally flat with an average elevation of 10m. above mean sea level.

6.2.2 *Geologic Units*

The rocks of Panglao Island are composed of three separate units. The oldest unit is the sierra Bullones Formation that underlies a large part and the flat areas of the island. Overlying the sierra bullones is the Maribojoc limestone, which forms the twin symmetrical hills in Dauis. The youngest geologic unit is the alluvial and beach sand deposit.

- *Sierra Bullones Formation*

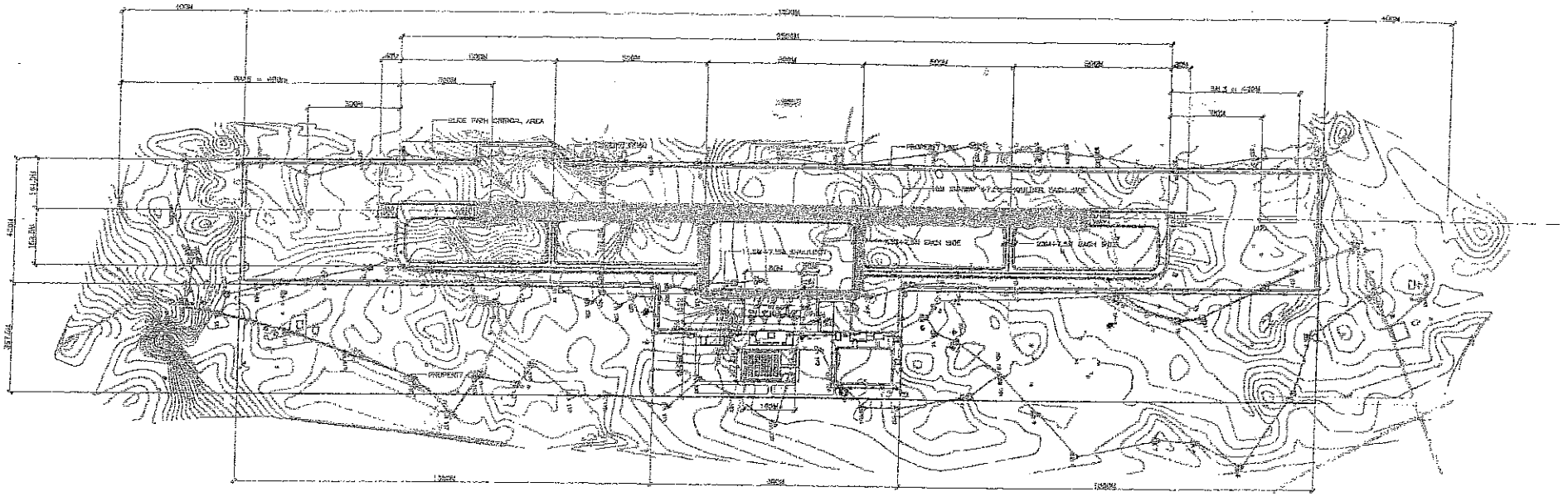
The Sierra Bullones Formation is the most extensive and thickest sedimentary formation out cropping in Bohol Island. This carbonate formation can be subdivided into two members: an essentially marly lower member, known as Sevilla marl; and a supper member, the Sierra Bullones Limestone.

The Sevilla Marl can be observed at sea level elevations in the southern coast of Panglao Island, forming the lowest sections of the cliffs. The marl beds are thin to measure usually made up by well-cemented reef clastic and sometimes by algae and corals, apparently not reworked. On the upper part of the section, the Sierra Bullones Limestone can be observed.

The limestone unit outcrops as a bedded, thin to marine, slightly re-crystallized, whitish gray and highly fasilliferous limestone, probably representing an open marine carbonate facies. It appears as a thick, massive, very soft, porous coralliferous biomicrite, and a bioarenite with numerous unsorted coral/algae clastics, which may represent a fore-reef facies. In some outcrops, the formation appears as thick, massive biohermal limestone usually re-crystallized, whitish to light gray, outcrops which should represent the main and coral algae reef barriers.

- *Maribojoc Limestone*

The hills near Dauis are underlain by the Maribojoc Limestone, a rock unit named by Arco, with its type locality at Maribojoc, Bohol. This limestone closely resembles the kargyle limestone of Cebu, being correlative in age and being poorly bedded cream to buff, marly, rubbly and coralline.



TOPOGRAPHIC MAP

FIGURE 6-2

➢ *Quaternary Alluvium*

The youngest rock units in Panglao Island are the recent unconsolidated deposits and recent coral growths in the fringing reefs. The unconsolidated deposits consist of mud, silt, sand and gravel deposited along stream channels, including the sand deposits in the lower reaches of rivers. The sand deposits along beaches and caves belong to this formation.

6.2.3 *Geologic Structures*

The main structural feature of Panglao Island is the doubly plunging syncline structure of the island. This structure creates a boat-like formation for the rock units, where the edges near the shores are curled up and the central portions maintain a deeper position. The syncline structure trends N 55°E and parallel to the trend of the whole island. This feature indicates that the thickest part of the geologic units is in the middle of the island, and from this central axis, the rocks dip upward towards the southern and northern shores. The eastern and western ends of the island are also tilted up creating a basin-like structure for the rocks. The thickest section of the rocks occurs at the ridge of the two hills near Dauis.

There are no major faults that had been observed in Panglao Island. The geologic and structural map of Panglao Island is shown in **Figure 6 –3**.

6.2.4 *Geologic Hazards*

➢ *Earthquake*

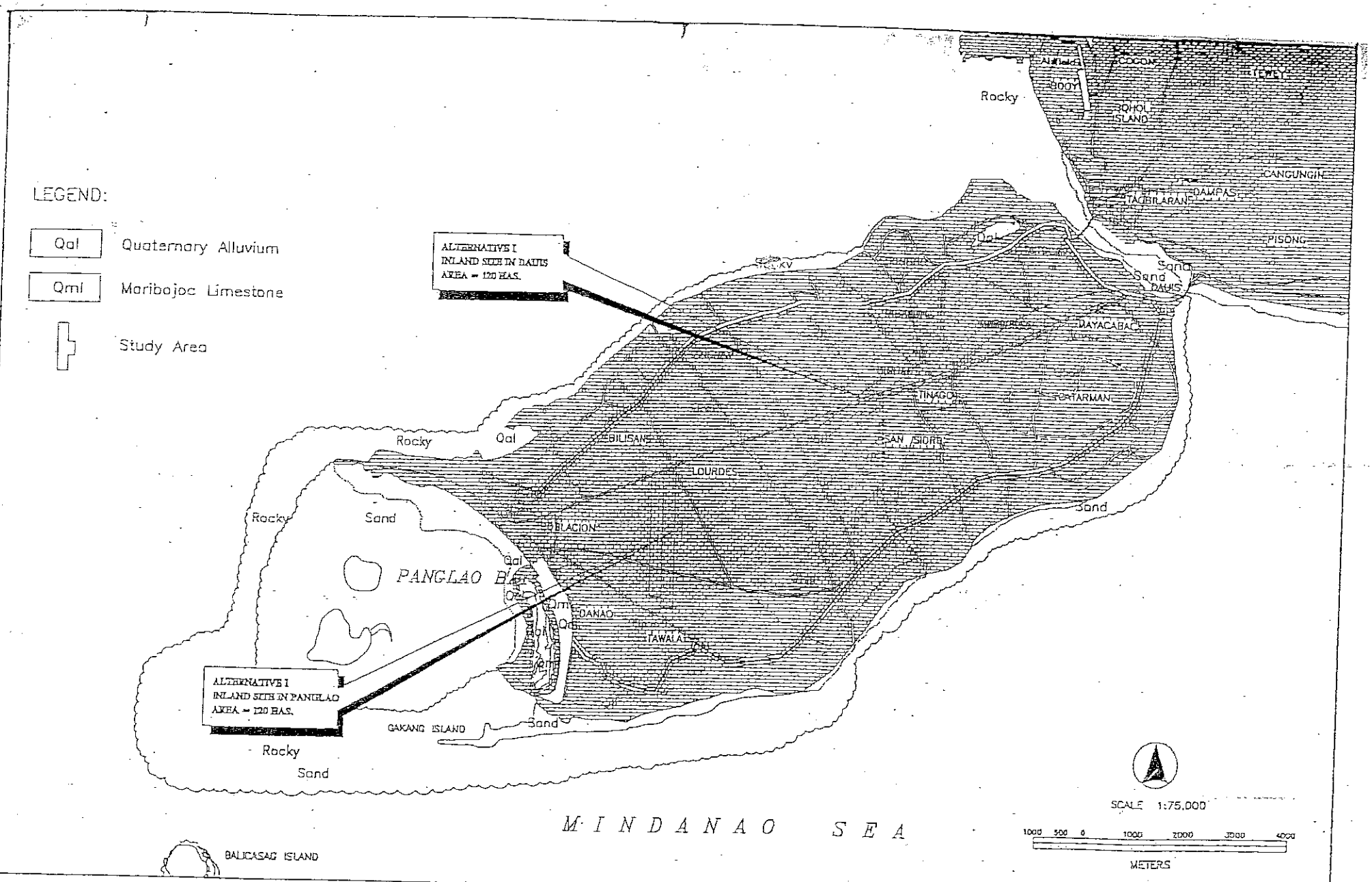
There are four (4) sources of earthquake that can affect Panglao Island. These are:

a. The Philippine Trench
b. The Negros Trench
c. The Philippine Fault System
d. Local Faults around Bohol

Figure 6 –4 presents the Seismicity Map of Central Visayas.

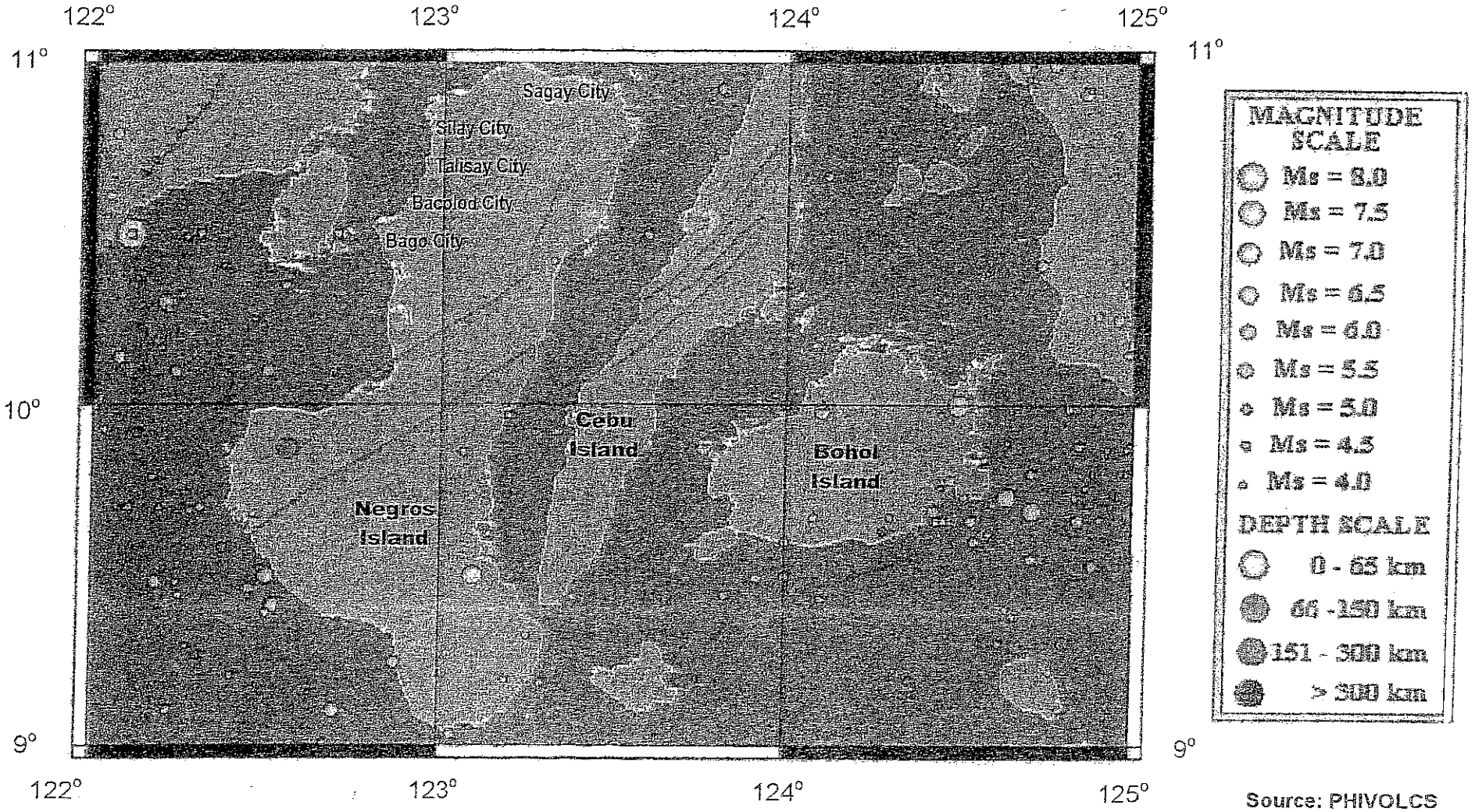
The eastern cost of the Philippines is marked by the Philippine Trench, a deep structure that represents the site where sub-duction of the Philippine Sea plate under the Philippine land mass taken place.

The Philippine Fault Zone traverses through the Ragay Gulf, running parallel to the eastern shores of the Bondoc Peninsula and cutting in



PROPOSED PANGLAO AIRPORT SITES

FIGURE 6-3
GEOLOGIC MAP



Source: PHIVOLCS

SEISMICITY MAP OF CENTRAL VISAYAS

Magnitude 4.0 and above (1907 to August 31, 2000)

FIGURE 6 - 4

half both the northern Bicol area along Guinyangan to Lopez, Quezon. This is the most active fault in the Philippines and in the major source of seismic hazard and not only for this part of Luzon but also for larger regions from Davao to Baguio.

Aside from the Philippine Fault, active subduction zones along the northeast and northern coasts of Bohol region are also sources of earthquakes.

There is no known local fault near the project site, although the presence of a major thrust fault on the eastern edges of Bohol Island is suggested by the recent large shallow earthquakes in this area. Since there is no known active fault in Panglao Island, no fault rapture hazards are expected to affect the project.

A peak ground acceleration not exceeding 0.11 g (or 11% of the gravitational acceleration) has been calculated (Thenhaus et. al. 1992) for the Central Visayas area, including Bohol and Panglao Island. This value is for rock substrate, which may be the condition in most of the area around the project site. These values are for a return rate period of 50 years and with a probability of non-exceedance of 90%. As to be expected, rock conditions produce less seismic acceleration, and soft soil conditions, produce higher acceleration.

In the absence of any insignificant alluvial deposit in Panglao Island, there is no significant liquefaction hazard in the project site.

6.2.5 Floods

The project site is assessed not to be affected by floods, in spite of excessive rainfall brought about by the passage of tropical cyclones.

6.3 HYDROLOGY

Panglao Island represents the typical island hydrologic system consisting of a freshwater lens floating on a body of seawater. The thickness of the lens is influenced by the rate of recharge, permeability of the water-bearing formation, and structure of the island. The distribution of the fresh and brackish water wells indicates that the lens is thickest at the center of the island and thins progressively towards the lower coastal areas where the shallow dug wells that yield brackish water are located.

The first level corresponds to the wells in the hilly sections in Mariveles and Catarman. Groundwater level in these areas generally varies from 47 to 61 meters above sea level. These wells tap the younger Maribojoc Formation.

The second groundwater level prevails in most of the flat sections of the island, which is underlain by the Sierra Bullones Formation. Groundwater levels in these areas normally falls within the range of 0 to 90 meters above sea level.

6.3.1 Groundwater

Groundwater in small islands like Panglao occurs as either perched or basal aquifers. Basal aquifers consist of unconfined, semi-confined or confined fresh water bodies, which form at on below sea level (Falkland, 1995). The high permeability of the limestone formation in the island favors the widespread occurrence of the unconfined type of basal aquifer including the section to be occupied or the airport. Most of the wells in the island tap this aquifer. Perched aquifers are tapped by the wells located at the in-filled valley located on the eastern hilly section of the island.

Groundwater occurrence in basal aquifers in small islands is generally governed by the classical Thyben. Herzberg Theory where for every unit height of fresh water occurring above mean sea level, there will be another 40 equal units of fresh water below mean sea level. The practical purposes, the ratio can be used as a guide in determining the midpoint of the transition zone from the water table elevation above mean sea level. It does not provide a means of determining the bare of the fresh water zone (Falkland, 1995). The result of the well inventory indicates the proximity of the fresh water lens to the coastal section of the proposed site.

6.3.2 Groundwater Quality

Groundwater samples were collected from two locations, namely: Barangays Tawala and Danao. See **Figure 6 –5** Water and Air Sampling Layout.

Result of the analysis is tabulated in **Table 6.5.**

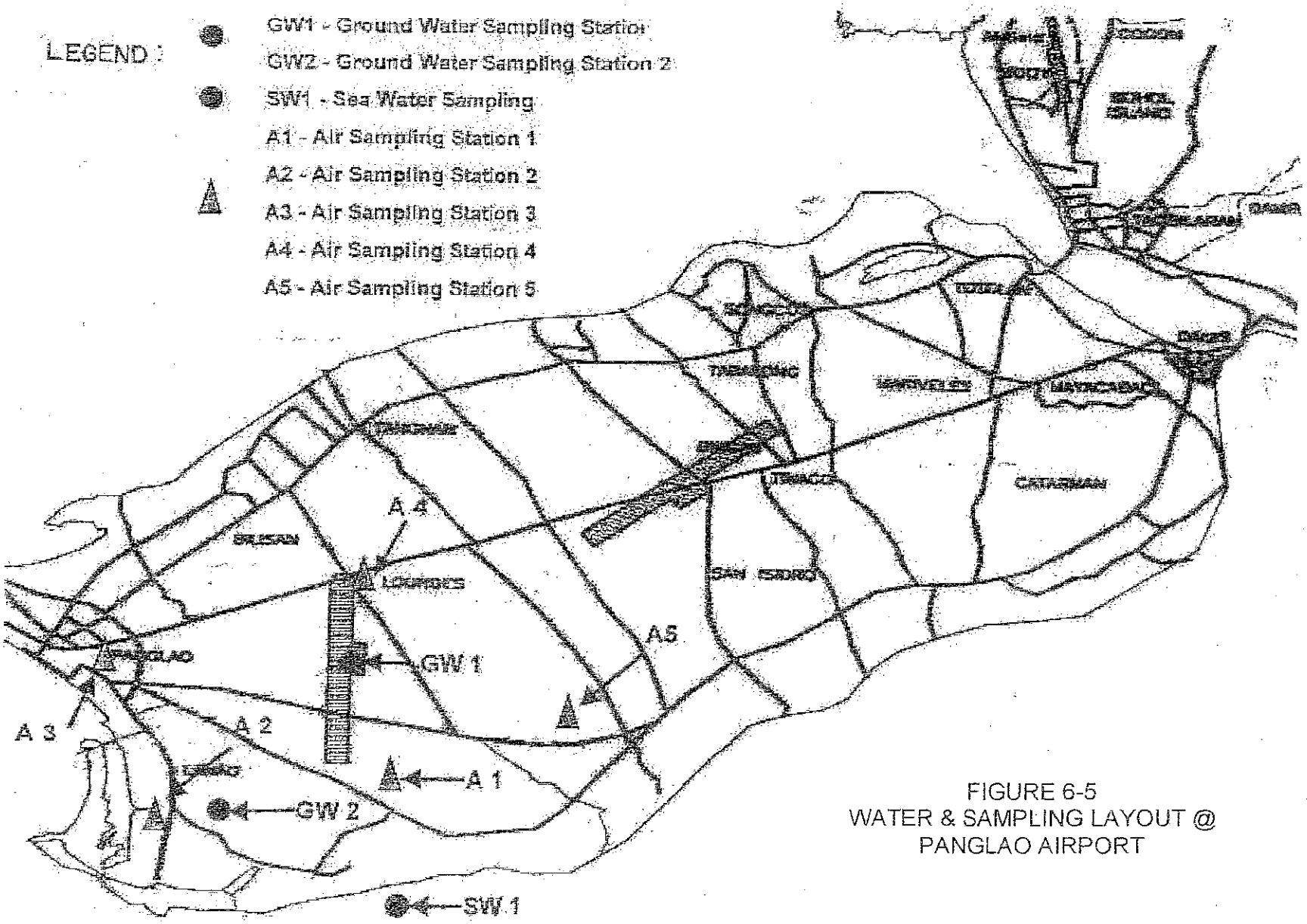


FIGURE 6-5
WATER & SAMPLING LAYOUT @
PANGLAO AIRPORT

Table 6.5 Result of Groundwater Analysis

Parameters	Results		Limit*
	Open Dug Well 1	Open Dug Well 2	
Chloride, mg/L	164	386	250
Total Hardness, mg CaCO3/L	252	296	300
pH Value	6.99	7.05	6.5-8.5
Total Dissolved Solids, mg/li	484	956	500
Sulfate, mg/L	7	35	250
Silica, mg/L	7.37	8.42	----
Iron,mg/L	ND	ND	1
Calcium,mg/L	81.70	88.92	----
Magnesium, mg/L	11.56	18.07	---
Heterotrophic Plate Count,CFU/mL	1,100 Est.	730 Est.	---
Coliform Count, MPN/100 mL	>16.0	>16.0	<2.2
Escherichia coli/DETECTION	Negative	negative	Negative

mg/L = milligram per liter
mgCaCO3/L = milligram Calcium Carbonate per Liter
--- = no available specification
ND = Not Detected
* = Philippine National Standards for Drinking Water 1993, DOH
CFU/mL = Colony Forming Unit per milliliter
MPN/100 mL = Most Probable Number per 100 milliliter
Est. = Estimated Count
> = greater than
< = less than

As reflected above, the value for *Chloride* and *Total Dissolved Solids* of water sample taken from Open Dug Well 2 exceeded the limit for the Philippine National Standards for Drinking Water. There is already an indication of saltwater contamination in some parts of the aquifer of the island. Another significance is the presence of coliforms in the groundwater. Contamination may be due to the seepage of domestic water coming from toilet facilities.

Related study was conducted in terms of groundwater quality. This can be found in the Water Resources Investigation and Geo-resistivity Survey (**Appendix XII**) for the Proposed Panglao Island Airport.

Table 6.6
Results of Chemical Analysis of Coastal Water Around Panglao Island, Bohol

	MW -1	MW -1B	MW -2	MW -2B	MW -3	MW -3B	MW -4	MW -5	MW -6	MW -7	MW -8	MW -9	MW -10	MW -11	MW -12	MW -13	DAO 34 Criteria for Class SA
ANALYSIS	082597-0847	082597-0848	082597-0849	082597-0850	082597-0851	082597-0852	082597-0853	082597-0854	082597-0855	082597-0856	082597-0857	082597-0858	082697-0884	082697-0885	082697-0886	082697-0887	
OD, mg/L	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3
otal Suspended Solids, g/L	ND	3.0	ND	ND	ND	ND	18	ND	ND	ND	ND	ND	ND	61	ND	5.0	>30% inc.
opper (Cu), mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-
admium (Cd), mg/L	0.22	0.22	0.21	0.21	0.20	0.22	0.24	0.21	0.23	0.23	0.23	0.22	0.19	0.19	0.19	0.19	0.01
hromium (Cr), mg/L	0.10	0.11	0.11	0.14	0.13	0.13	0.13	0.11	0.16	0.18	0.14	0.13	0.13	0.13	0.10	0.11	0.05
ead (Fb), mg/L	0.57	0.57	0.46	0.46	0.57	0.68	0.79	0.79	0.79	0.79	0.79	0.79	0.57	0.68	0.46	0.68	0.05
ercury (Hg), mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
onductivity, mS/m	62.2	50.6	54.7	52.8	53.2	52.9	52.6	52.1	52.2	52.4	51.2	51.3	54.0	54.8	51.3	51.5	
itrate (NO3), mg/L	1.40	1.30	2.4	2.6	1.6	1.2	1.8	1.8	ND	1.3	1.8	ND	1.3	0.90	2.1	2.0	
osphate (PO4), mg/L	0.41	ND	ND	0.38	0.35	0.34	ND	0.15	ND	0.07	ND	ND	0.30	0.26	0.10	0.08	
otal Alkalinity, mg/L aCO	137.30	128.0	130.9	129.0	129.9	127.2	126.2	129.9	127.2	127.6	124.9	123.5	148.4	144.7	133.6	128.1	
carbonate (HCO3), g/L CaCO3	100.4	82.0	77.4	84.8	79.3	77.4	75.6	96.8	73.7	81.5	75.1	75.6	55.3	40.6	106.0	87.5	
rbonate (CO3), mg/L CO3	36.9	46.1	53.4	44.2	50.7	49.8	50.7	33.2	53.4	46.1	49.8	47.9	93.1	104.1	27.6	40.5	
ssolved Oxygen, mg/L	9.0	10.4	9.0	11.5	11.1	9.1	10.3	6.5	6.4	7.4	8.6	7.7	12.9	13.7	6.7	7.3	70% sat.
l and Grease, mg/L	ND	ND	ND	ND	ND	ND	ND	1.1	2.9	1.5	-	-	0.9	ND	-	-	1
tal Coliform, MPX 100	>1,100	25.0	150.0	43.0	<3.0	23.0	1,100	240	120	3.0	43	<3.0	15	3.0	14	9.0	70
cal Coliform, MPN/ 0 mL	1,100	23.0	75.0	43.0	<3.0	9.0	1,100	240	120	<3.0	15	<3.0	3.0	3.0	4.0	4.0	nil

= is none detected; minimum detection limit in mg/L
= 0.05 0.05 0.09 0.01
= .009 0.01 0

ce: Ecoprofile of Panglao, SEASTEMS, Inc., 1999

6.4 OCEANOGRAPHY

6.4.1 Coastal Water Quality

Previous study of SEASTEMS, Inc. included sixteen (16) sampling sites for the determination of the coastal water quality. Stations MW –1A and 1B, MW –2A and 2B, and MW –3A and 3B are located near the proposed tourism estate and the rest are distributed around the island.

At present, the coastal water of Panglao Island can be classified as Class SB, i.e., as Recreational Water Class 1 (areas regularly used by the public for bathing, swimming, skin diving, etc.) and Fishery Water Class 1 (spawning areas for *Chanos chanos* and similar species). However, for the purpose of this study, the coastal water is considered as Class SA, that is, as a tourist zone (DENR DAO-34).

The salinity of seawater ranges from 33 to 38 parts per thousand (ppt) that is generally consistent and is dominated by sodium (Knezovich, 1994). **Table 6.6** shows that the salinity observed in the 16 sampling ranges from 34 to 38 ppt.

The elements that make up sea salt are conservative, that is, they do not change significantly due to biochemical or geo-chemical activities (Knezovich, 1994). A narrow pH range of 7.9 to 8.2 was also observed which indicates that the seawater is well buffered Reid (1961) attributes this to the consistency of seawater. The relatively narrow pH range is largely determined by the concentrations of bicarbonate. This occurs because carbon dioxide, which occurs largely as bicarbonate in seawater (approximately 25 mgC/L) is present in excess of amounts required for plant growth. The total alkalinity in all the sampling sites did not differ significantly.

Seawater consists of a solution of inorganic salts, atmospheric gases, traces of organic matter, and small amounts of particulate material (Millero and Sohn, 1992). Although nearly all natural elements exist in seawater, Kennish (1994) organized them into four major groups: major, minor, trace, and nutrient elements. Each group of elements is vital to the organisms inhabiting the oceanic environment. The four major constituents are sodium, magnesium, chloride, and sulfate. Some of the minor constituents are cobalt, manganese, iron, copper, and zinc. Cadmium, chromium, lead and mercury are among the trace elements. Results of water quality analysis show that copper and mercury were not detected, that is, the concentration is less than 0.009 mg/L and 0.001 mg/L, respectively (see **Table 6.6**). However, the limit of 0.05 mg/L set for Class SA was exceeded by chromium and lead. Cadmium, which has a limit of 0.01 mg/L, ranged from 0.19 to 0.23 mg/L. The same is true

even if the limits for Class SB were to be used, except for chromium whose limit was set at 0.1 mg/L. These dissolved constituents originate primarily from the weathering of rocks and leaching of soils on land such that the excess concentration maybe considered as the natural background concentration.

However, Kennish (1994) emphasized that while the weathering of rocks and leaching of soils are responsible for a portion of the heavy metal concentrations in water, anthropogenic inputs from domestic or industrial sewage, landfill leachates, and boating and shipping activities may far exceed the heavy metal fractions derived from the weathering processes. Comparison to previous water quality of the coastal water of Panglao Island could not be made due to the absence of secondary data.

Total suspended solids concentration of 3, 18, and 61 mg/L were correspondingly recorded only in stations MW -1B, MW -4, MW -11. The latter is in a lagoon located northeast of the island. Since it is slightly protected from strong waves, the total suspended solids could be of biogenic origin, i.e. consisting of plank tonic species.

Water samples for oil and grease were collected only in stations where there could be possible contamination. This contaminant was detected in two closely located stations i.e., station MW-5, which is near the Causeway Bridge, and station MW-6, which is off the pier site. The latter whose oil and grease concentration was 2.9 mg/L exceeded the limit of 1 mg/L for Class SA water. Station MW -7 which is located near an area where fishing boats abound, had an oil and grease content of 1.5 mg/L.

The dissolved oxygen content of the water varies from 6.4 mg/L in station MW -6 to 13.7 mg/L in station MW -11. The latter station is inside the lagoon and the high DO concentration could be attributed to high photosynthetic rate of sea-grasses. The same is true for the high DO concentration of 12.9 mg/L in station MW -10 where sea-grasses also abound. The phytoplankton could have also contributed to the high DO content. The DO concentration in all the sampling sites exceeded the minimum limit of 70 percent saturation (sampling taken between 9:00 am and 4:00 pm as DENR-DAO-34). This could explain the low BOD (biochemical oxygen demand) of 1.0 mg/L in all the sites investigated. The maximum limit is 3.0 mg/L.

In terms of total coliform, the maximum limit of 70 MPN/100 ml was exceeded in stations MW -1, 2A, 4, 5, and 6 (see **Table 6.6**). Station MW -5, which is near the docking area at the Causeway Bridge and station MW -6 within the vicinity of the pier in Tagbilaran City had a total coliform content of 240 and 120 MPN/100 ml, respectively.

Considering the activities in the area near these stations and the presence near the shore of numerous houses without toilet facilities, higher coliform content was expected. The highest counts were observed in stations MW -1A which is off the Alona Kew's resort and station MW – 4 off Biking at more than 1,100 MPN/100 ml and 1,100 MPN/100, respectively. Fecal coliforms were detected in all the sampling sites, and correspondingly, the highest numbers were observed in the same stations with the high total coliform counts. These results, however, although very alarming, were based on single observations and there is a need to conduct additional tests. Again, as specified in the DENR -DAO 34, the limit refers to the geometric mean of the most probable number of coliform organisms during a three-month period and that the limit indicated shall not be exceeded in 20 percent of the samples taken during the same period.

During site visit conducted on August 1, 2000, seawater sample was taken in front of Alona Kew Beach the nearest resort to the proposed project site. **Table 6.7** reflects the result of the analysis.

Table 6.7
Results of Chemical and Biological Analysis of Nearest Coastal Water to the Project Site

Parameter	Result	Limit*
Biochemical Oxygen Demand, mg/L	19	3
PH Value	7.48	-
Total Suspended Solids, mg/L	29	>30% inc.
Oil and Grease, mg/L	Not Detected	1
Coliform count,MPN/100 mL	<2	70
Fecal coliform count, MPN/100 mL	<2	Nil

Of significance is the BOD value of 19 mg/L, which exceeds the maximum limit of 3 mg/L. This may be due to the nutrient elements of domestic sewage drained in the coastal waters.

6.4.2 Tides

- ***Tidal Fluctuations***

The tides affecting the island as observed are mainly of semi-diurnal type tending to have diurnal tides (for about two days), two to three days before spring tides. Otherwise, the prevailing tides are purely semi-diurnal. The rising and lowering of the water elevations generate the pressure differential responsible for the tidal flow which is modified by the bathymetry and shape of the sea basins with regards to its direction and magnitude. *(Seastems, Inc., 1999).*

➢ *Tidal Currents*

On the northern side of the island, the tidal currents during flood tide flow in the northeast and northerly directions. The reverse is true during the ebb tide. However, Maribojoc Bay, a cove and a shallow coastal sea, north of Panglao Island deflects the southerly ebb tidal flow eastward and then follows the coastline northeast of Panglao Island across the narrow entrance channel of Tagbilaran Port towards the shallow eastern coast of Maribojoc Bay. This water mass joins again the ebb flow that runs southward.

At the western coastlines of the island, where the coastal slopes are quite steep, the ebb flows are stronger and in the southwesterly direction. The flood tides in the shallows of Panglao Bay enter at the southern and western inlets of the bay. During ebb tides, the water mostly drains out from the western inlet, a depression just south of Pungtud Island, at a swifter rate.

South of the island, within the two-minute distance (about 4 kilometers) from the shoreline, the flow of the ebb tide was found to be towards the northeast tending to slowly flow south-southeast during slack low. During flood flow the reverse is true. However, fishermen who used to fish in the southern seas of Bohol, between Camiguin Island and Pamilacan Island gave different observations. Accordingly, the flood tides they observed were moving eastward towards Surigao Strait and westward during ebb tide. *(Seastems, Inc., 1999).*

6.4.3 Bathymetry

The northeastern coastline of the island may be of high concern, most especially that the channel between the main island of Bohol and Panglao Island is almost close to the natural water flow that maintain ecological balance of all the living organisms that thrive therein. Several physical factors may have contributed to its current conditions. Specific and detailed coastal and oceanographic studies are necessary to correct the on-going trend of silt and sedimentation built-up.

The western coastlines have very steep slopes with mostly coralline white beaches. Depths of more than 200m are found less than 500 meters from the shoreline. Further southwest, the deepest portion of the channel between Balicasag and Panglao Island is 383 meters.

The southeastern coastlines have gradual slopes that extend from Barangay Bolod to a six-minute distance (about 12 kilometers) southeast

near the Cervera Shoal. Depths in these areas are less than 200 meters. Within a four-minute (about 8 kilometers) distance, east of the Cervera Shoal is the Pamilacan Island. Northeast of this island, a steep slope runs northeast towards the main island of Bohol, near Loay coastal zone forming a sort of a bank. *(Seastems Inc., 1999).*

6.4.4 *Windfield*

At a glance, the prevailing winds are south-westerlies and southerlies from May to October and north-easterlies and northerly winds during the other half of the year. The average speed within 35 years is 2.0 mps. with north-easterlies greater in magnitudes compared to south-westerlies. It is also the prevailing direction. *(Seastems, Inc., 1999).*

6.4.5 *Sedimentation*

The northeastern coastal sea of Panglao Island, south of Maribojoc Bay, may be subjected to a tremendous load of silt that comes from the eastern coast of Bohol due to the prevailing tidal current and shape of the bay, river bank and coastal erosion, uncontrolled agricultural activities, deforestation, land development and construction, mining and other geo-related activities. This is affecting the channel at the entrance of the port of Tagbilaran City. *(Seastems, Inc., 1999).*

At the southeast coastal zone of Panglao Island, silt load could also be prevalent on the bank running northeast from Pamilacan Island because of the slowing down of tidal currents running eastward in the near shore area, and the westward movement of the ebb current in the deeper sea. The prevailing current at this part of Panglao Island coastal sea may indicate that this could be part of a strong eddy system of the waters coming from the North Equatorial Pacific Current through Surigao Strait and the Sulu Sea. This may bring silt and fine soil particles at this bank formation. Another accumulation of silt may be present near the southern entrance and in the channel between Bohol and Panglao Islands. Current measurements were done in the channel four years ago and at that time the water flow was still very visible and fast. These days, however its almost at a standstill and nil. *(Seastems, Inc., 1999).*

6.5 ATMOSPHERE

Based on eco-profiling conducted in 1997 by SEASTEMS, Inc., the one-hour ambient ground level concentrations of Total Suspended Particulate (TSP) are very low and typical of rural environment. Increased levels of TSP are noted with the occasional passage of vehicles in the unpaved roadways. The values range from 2.96 – 95.37 ug/Ncm with the exemption of three stations with values ranging from 158.99 ug/Ncm to 775.08 ug/Ncm. Two stations exceeded

the DENR one-hour ambient standard of 300 ug/Ncm for the SO_2 and 260 ug/Ncm for NO_2.

The noise level in the various stations ranged from less than 40 to 50 decibels [dB (A)]. Results are within the DENR standard of 55 dB (A) during daytime for residential areas, except in two (2) stations where the standard was exceeded by 1 dB (A). As reported, these values were recorded during passage of vehicles. Vehicular passage in the island is seldom, about one vehicle in 30 minutes. **Table 6.8** shows the concentration of the various air quality parameters and noise level measurements.

To obtain primary data for noise and ambient air, sampling was conducted by CRL Environmental Corporation and TCGI on July 31-August 1, 2000. Results are tabulated in **Table 6.9**.

Table 6.8
Observed Air Quality in Panglao Island, Bohol (October 20 – 23, 1997)

Stn.	Date/Time		Concentrations in ug/Ncm			Noise	Coordinates	Station Name
			SO_2	NO_2	TSP	DB (A)		
4.5	20Oct.97	1030-1130	2.528	3.400	52.058	46-52	9°34'52"N 123°45'09"E	Panglao Public Market
6.5	20Oct.97	1055-1155	8.272	4.944	35.034	<40-44	9°35'06"N 123°45'50"E	Bogy. Looc, Panglao-Dauis Road
8.5	20Oct.97	1300-1400	3.033	8.158	68.940	<40-43	9°35'30"N 123°46'49"E	Bogy. Lourdes, Panglao-Dauis Road
10.5	20Oct.97	0835-0935	3.568	7.998	35.573	50-56	9°35'53"N 123°47'51"E	Bogy. Lourdes High Sch.
12.5	20Oct.97	1325-1425	4.853	4.351	5.155	<40-46	9°36'13"N 123°48'39"E	Bogy. Tinago, Panglao-Dauis Road
14.5	20Oct.97	1505-1605	6.500	6.798	7.569	42.50	9°36'33"N 123°49'52"E	Bogy. Tinago, Panglao-Dauis Road
16.5	20Oct.97	1620-1720	3.033	4.532	14.822	45-52	9°37'00"N 123°50'28"E	Bogy. Mariveles, Panglao-Dauis Road
4.3	21Oct.97	1005-1105	12.638	5.665	2.964	45-50	9°33'52"N 123°45'31"E	Bogy. Danao, Panglao
4.1	21Oct.97	1125-1225	4.044	10.877	5.646	50-54	9°32'49"N 123°45'41"E	Sitio Darong, Bogy. Danao, Panglao
6.1	21Oct.97	1355-1455	20.221	3.340	43.686	44-50	9°33'39"N 123°46'45"E	Bogy. Bolog, Panglao
16.7	21Oct.97	1510-1610	12.132	8.158	20.751	50-55	9°38'14"N 123°50'49"E	Bogy. Tutulan, Dauis
14.7	21Oct.97	1625-1725	19.499	6.798	31.813	<40-42	9°37'44"N 123°49'51"E	Bogy. Sungculan, Dauis
12.7	21Oct.97	1610-1740	6.070	4.079	32.608	42-48	9°37'17"N 123°48'54"E	Bogy. Tabalong, Dauis
6.3	22Oct.97	0805-0905	9.100	3.626	11.858	<40-42	9°34'16"N 123°46'44"E	Old Airport Area
8.1	22Oct.97	0830-0930	10.399	11.654	63.849	47-54	9°33'40"N 123°48'00"E	Bogy. Bolod, Panglao
8.3	22Oct.97	1005-1105	8.341	8.158	5.929	<40-43	9°34'31"N 123°47'46"E	Bogy. Libaong, Panglao
14.3	22Oct.97	1140-1240	4.044	5.439	53.642	42-46	9°35'46"N 123°50'38"E	Bogy. Biking, Dauis
16.3	22Oct.97	1200-1300	4.044	7.252	158.999	47-55	9°36'18"N 123°51'42"E	Bogy. Catarman, Dauis
12.3	22Oct.97	1345-1445	16.176	9.971	5.160	<40-44	9°35'29"N 123°49'41"E	Bogy. San Isidro, Dauis
10.3	22Oct.97	1405-1505	12.132	6.118	8.469	<40-41	9°35'12"N 123°48'46"E	Bogy. Dao, Panglao
10.1	22Oct.97	1525-1625	5.055	10.877	2.964	48-56	9°34'14"N 123°49'02"E	Blue Sky Beach Resort
6.7	22Oct.97	1655-1755	8.921	11.197	8.085	<40-45	9°36'01"N 123°45'36"E	Bogy. Bilisan, Panglao
4.7	22Oct.97	1710-1810	23.332	18.826	95.376	<40-46	9°36'00"N 123°45'14"E	Bogy. Looc, Panglao (Near shore)
10.7	23Oct.97	0740-0840	7.583	5.099	364.405	42-48	9°37'06"N 123°47'45"E	Bogy. Bingag, Dauis
8.7	23Oct.97	0810-0910	14.154	6.345	775.083	47-55	9°36'44"N 123°46'51"E	Bogy. Tanglan, Panglao

Source: Ecoprofile of Panglao, Seastems, Inc., 1999

Table 6.9
Observed Ambient Air Concentrations of SO2, NO3, Pb, and TSP in Comparison with the DENR NAAQS (in ug/Ncm)

Stn. No.	Location	Date/Time of sampling	SO2 (ug/Ncm)	NO2 (ug/Ncm)	Pb (ug/Ncm)	TSP (ug/Ncm)	Noise db(A)
1	Tawala Elem School	31 July 2000/ 1:15 PM – 2:15 PM	ND	32.2	ND	4.9	51.3
2	Bogy. Hall of Danao	31 July 2000/ 3:00PM – 4:00 PM	ND	22.7	ND	429.7	50.3
3	Mun. Hall of Panglao	31 July 2000/ 4:30 PM – 5:30 PM	ND	9.4	ND	32.3	50.5
4	Bogy. Tawala near National Road	01 August 2000/ 8:00 AM – 9:00 AM	ND	22.8	ND	5.1	51.9
5	Bolod Elem. School Intersection	01 August 2000/ 9:40 AM- 10:40AM	340	28.3	ND	10.3	52.7
DENR STANDARD		1 HR SAMPLING	340	260	20	300	See Table VII.3

Ambient air monitoring was conducted 1-hour at five sampling stations. The observed average air concentrations of SO2, NO3, Pb, and TSP, ranged from the following limits: not detected, 9.4 to 32.2 ug/Ncm, not detected, and 4.9 to 429.7 ug/Ncm, respectively. All aforementioned parameters except TSP were well within the National Ambient Air Quality Guidelines (NAAQG).

The highest measured TSP was recorded at the Bogy. Hall of Danao at 429.7 ug/Ncm caused by fugitive dust emission brought by the passing vehicles along the rough and dusty road of the area.

The observed and equivalent noise levels showed wide variations caused by vehicular traffic and from car bodybuilding & repair shop at the site.

Bolod International School Intersection experienced noise levels as high as 52.7 db(A) in the daytime but this was within the DENR standard with the +5 db(A) correction factor. This noise level was due to the noise from car bodybuilding and repair shop.

Details of air quality sampling cannot be compared to the data obtained from SEASTEMS since sampling stations used are not the same.

6.6 VEGETATION

6.6.1 Plant Communities

Panglao Island's terrestrial ecosystem supports two major types of terrestrial plant communities: the natural plant communities and the man-made (anthropogenic) plant communities. The proposed site for the airport is basically an open area dominated by residential and agricultural lands with occasional patches of fruit trees and bamboo thickets. About 30% of the sites are regulated with native shrubs and grasses, which have low economic value and are furthermore fire-prone.

The nearest mangrove forest ecosystem is located about 1.25 kilometers away from the south-south-western tip of the airport.

6.6.2 Species Diversity

There are 177 species of plants encountered during the 1997 ecoprofiling at Panglao Island. The most number of plant species are found among man-made plant communities (coconut plantations, cornfields, banana plantations, ube fields, omelina plantations, mahogany plantations, fallow fields, and built-up areas.

Of the 177 species, there are 81 trees (majority are rather small), 40 herbs, 36 shrubs, 9 vines and 11 species belonging to a special group that includes the palms, pandans, bamboo, and cycads.

6.7 FISH AND WILDLIFE

Panglao Island can be classified as a low biodiversity area even in agro biodiversity terms. It forms part of the Mindanao Fauna Region which means that its fauna is more closely related to those found in Mindanao, Leyte Samar and Bohol than those in Cebu.

The tarsier, Tarsus syncta, is found in Bohol, Leyte Samar and Mindanao but not in Cebu or Negros. This species, however, is not present in the site.

The diversity of wildlife species observed in the site is low. This is due to the absence of natural water systems and forest-like habitats in the site.

Based on previous study conducted by SEASTEMS in wildlife study sites, some 63 species of wildlife was recorded, comprised of one species of amphibians, seven species of reptiles, 48 species of birds and eight species of mammals.

6.8 LAND USE

Panglao municipality has retained a predominantly agricultural and rural character. A sizable portion (about 100%) of the island's total land area of about 9,070.1 hectares (4,508.6 for Dauis and 4,511.5 for Panglao) is allocated to marginal agriculture and coconut plantation.

Figure 6 –6- shows the general land use map of the island.

6.8.1 Agricultural Areas

Panglao Island remains a predominantly agricultural area with approximately 5,933 hectares or 65.78 percent of its total land area devoted to agriculture.

6.8.2 Coconut Plantation

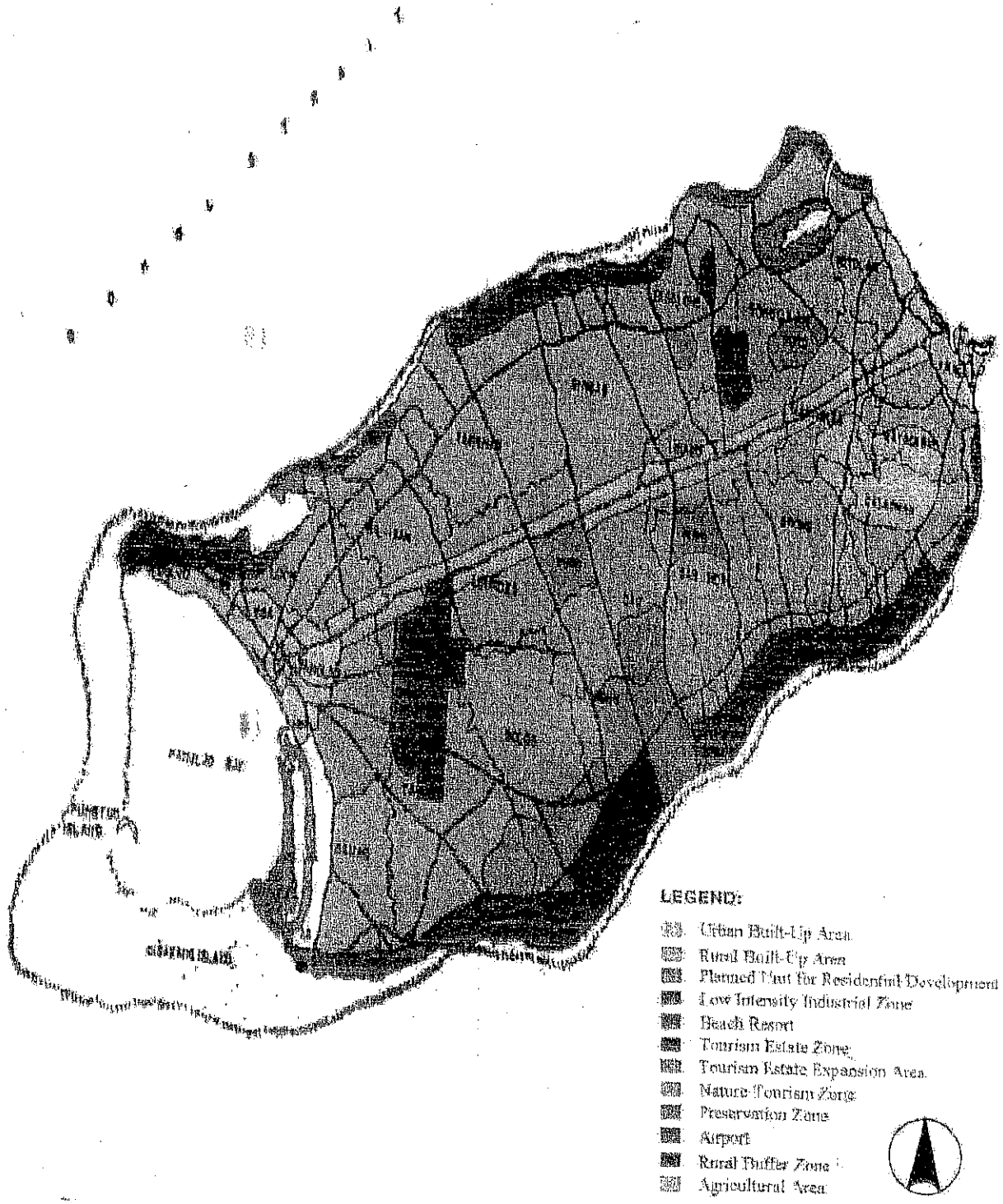
Coconut plantation are delineated separately as they comprise a sizable portion, about 912.6 hectares or 10.12 percent of the island's predominantly agricultural landscape. Big tracts of coconut plantations occupy the north and northwestern section of the island primarily in the localities of Deljo, Pangnan, Bilisan, and Danao, all in the municipality. Coconut plantations on the island are not normally inter-cropped. The undergrowth is mostly grass and shrub, which are used occasionally for pasture.

6.8.3 Bushland

Bushland comprise a mixture of shrub, brushwood, and sparse stands of trees and coconuts. These account for approximately 1,795 hectares or 19.90 percent of the island's total land area. A wide swath of bush lands cover the southwestern section of the island in Panglao municipality and extends northward along the coast to Dauis just across Bicag Hills.

6.8.4 Grassland / Open Areas

Small patches of grasslands found on the slopes of Bicag Hills are interposed with bush lands and agricultural areas. Some isolated patches are similarly mixed with agricultural lands in the relatively flat areas of Dauis municipality. Grasslands comprise about 94.7 hectares or 2.15 percent of the island.



LAND USE MAP

FIGURE 6-5

6.8.5 *Built-up Areas*

There are two built-up areas corresponding to the two town centers of Panglao and Dauis. Situated at opposite ends of the island, the two built-up areas are connected by a road spine that traverses the island in the east-west direction. The built-up areas are characterized with a good concentration of residential hall, church, health center, and schools. The built-up areas do not attain an urban character despite intense land using activities. The built-up areas account for about 117.9 hectares or 1.31 percent of the total.

6.8.6 *Quarry*

Three quarry sites make up a total of 1.9 hectares or about 0.02 percent of the total land area of the island. A sand and gravel quarry is also being operated in the municipality of Panglao as source of local requirements for construction materials.

6.9 SOCIO-ECONOMIC ASPECTS

6.9.1 *Population and Number of Households*

Panglao Island consists of two municipalities, namely, Dauis and Panglao. These municipalities registered a total population of 42,136 persons in 1995 with Dauis and Panglao representing 57.1 percent and 42.9 percent of the population, respectively (NSO, 1995).

In 1996, the island registered a total population of 42,418 persons with Dauis and Panglao accounting for 56.06 percent and 43.94 percent of total population, respectively. The average number of household members is 5.3 persons for 8,003 households. Panglao municipality accounts for 3,516 households, while Dauis register 4,487 households. Panglao Island has a mean population density of 4.55 persons per hectare. The total population of Panglao Island represents about 4.4 percent of the total provincial population.

There are no ethnic or indigenous cultural communities in the island.

6.9.2 *Population Density*

Based on Panglao Island Comprehensive Land Use Plan (PICLUP) for 1996 – 2005, the population density for the island is 4.13 persons per hectare, with Dauis being more densely populated at 5.5 persons per hectare than Panglao municipality with 3.07 density. Computations based on 1995 NSO figures reflects a density for Panglao town at 3.8 person/hectare and 5.3 person/hectare for Dauis.

6.9.3 *Migration*

Data on migration could not be obtained. Informal accounts indicate that foreigners buy land through their spouses with some eventually settle down in the island is a growing trend. Past decades show members of the working population leaving the island towards Mindanao for better source of livelihood. However, with the growing tourism industry, migration was lessened.

6.9.4 *Education*

Elementary level education is being provided solely by the government through the 24 elementary schools located in the 22 barangays in the island. The municipality of Panglao actually has two (2) schools more than its total number of barangay.

A good number of the residents of the island are literate with Dauis and Panglao having literacy rates of 93.55% and 95.03%.

Secondary level education in the island is provided by four (4) high schools, one private and three publics. Dauis and Panglao have two high schools each. The lone private school is located in Panglao.

6.9.5 *Employment*

The island has an average employment rate of 90.36% with Dauis slightly higher at 91.11% and Panglao slightly lower at 89.62%. A little over one half of these employed are males with Dauis having a proportion of 53.97% and Panglao with 60.84%.

Based on survey conducted by SEASTEMS INC., in 1997 majority of the respondents (86%) earn their living from agriculture (e.g. farming only, fishing only, livestock only, or a combination of two or three). The rest (13.9%) are either teachers or other professionals, barangay officials, employees, or workers in tourism establishments, or overseas contract workers.

6.9.6 *Housing Infrastructure*

Majority of the houses are simple structures made up of wood and concrete. There are no housing projects or subdivision found in the island.

6.9.7 *Business Establishment*

There are about 294 industrial and commercial establishment in the island (Perception Survey Result, 2000). There are two PLDT toll stations, one rural bank, a gasoline station, drug store, trucking and hauling shop, and one cockpit at the Poblacion. The average income from business ventures is ₱ **24,276** per year.

6.9.8 *Transportation*

The island is traversed by the national provincial, municipal and barangay road network. The island's main roads are near to the urban road network of Tagbilaran City, the provincial capital.

Panglao has a total of 94.061 kilometers (km) of road, broken down into 54.5% barangay, 11.8% municipal, and 26.8% provincial and 6.9% national roads. Dauis on the other hand, has a total of 91.28 km. of road, which comprises 59% barangay, 2.4% municipal, 28.9% provincial, and 9.7% national roads.

The primary modes of transportation in the island are buses and tricycles.

The island has no seaport or wharf but it has a privately owned mini-airport, which services the island's main beach resorts. The island population is too dependent on Tagbilaran City's port facility. Approximate distance of the municipal centers to Tagbilaran port is 7.5 km from Dauis and 19.5 km from Panglao. Travel time for these distances through good and bad roads, per accessibility analysis report of Provincial Land Use Planners (PLUPs), are approximately 10.0 minutes from Dauis and 45.0 minutes from Panglao.

Panglao and Dauis are identified as sub-provincial center and village center categories under the 1990 hierarchy of center study conducted for the Bohol Provincial Physical Framework Plan.

6.9.9 *Community Infrastructure*

- *Water Supply System*

The main sources of water in the Island are the deepwells, which already supply water to more than 1000 household. However, in the municipality of Panglao, there are still three barangays (Libang, Bolod, and Tawaler) with no water. Development of the water supply in these barangays will be included in Phase II of the water supply development program under the Central Visayas Water and Sanitation Project.

- *Power Supply and Distributions*

  Electric power is supplied by the NAPOCOR, with the increased population and economic activity to be brought about by the tourism project, additional power will be required.

- *Telecommunications Systems*

  PLDT public calling stations are open from 7 a.m. to 10 p.m. The Bohol Beach Club is the only area with direct telephone connections.

  Other means of communication is through radio system where two to three radio units are available in each barangay.

- *Solid Waste Disposal*

  The present waste disposal system is open dumping. Garbage collection is done by dump trucks on a daily basis and brought to the dumpsite for burning. The provincial government plans to develop a landfill site in Tagbilaran City.

- *Health Facilities*

  Reports show that the municipality of Panglao has one main health center at the Poblacion and five-barangay station located in Bil-isan, Tangnan, Bolod and Danao. Hospital is not available in the area. Patients are brought to hospitals in Tagbilaran City for further medical care.

6.9.10 Rich Past Heritage / Cultural Attractions

- *The Church of Dauis*

  Dauis is one of the oldest municipalities in Bohol. During World War II, its records were burned so there is no record of its establishment exists. With the existing stone church tower built near the present church bears the year 1774, which most have been the year of its construction.

- *Geologic Feature*

  Only one geologic feature in the island has tourism value. This is the Hinagdan Cave. Hinagdan Cave is located in Barangay Bingay, Municipality of Dauis.

➢ *Areas with High Scenic View Value*

With its generally flat terrain, there are few vantage points in island. There are the Bicag Hill, Dayo Hill, in both Dauis and Bolod Hill in Panglao municipal. The Bicag Hill is the highest and offers a sweeping view of the island, Tagbilaran and the sea.

SECTION 7 Future Environmental Conditions Without the Project

7.1 GENERAL

Comparing the future conditions without the project against those conditions where the project is implemented is essential for weighing the project's benefits against its impacts. Hence, the future environmental conditions without the project are presented in this section.

7.2 CLIMATE

Considering the available data, no sudden changes in the microclimate could be expected in the project area for the next five years. Without significant changes in the environment, changes in temperature, wind direction and speed, rainfall, relative humidity, etc. are also not expected.

7.3 TERRAIN

The geology of the project site will remain unchanged. What may change within the next five to ten years are the geologic processes in the site, specifically erosion and sedimentation. The rates at which these processes occur are affected by anthropogenic activities and natural phenomena. Land disturbance due to agricultural practice and earth moving activities will hasten the rate of erosion and sedimentation. On the other hand, environmental enhancement activities like installation of engineering interventions will have stabilizing effects and this will reduce the rates at which these processes occur in nature. Natural phenomena which may trigger increased rates of erosion are increased rainfall intensities and ground shaking due to earthquakes.

7.4 HYDROLOGY

Without any major development in the area, the demand for water is likely to increase slightly from its present level. This increase will be due to the natural population growth expected in five years time.

Saltwater contamination and effect of domestic waste in groundwater may increase considering the high permeable characteristic of the limestone formation in the area Use of fertilizers and pesticides in agriculture is another potential causes of groundwater contamination.

7.5 OCEANOGRAPHY

With or without the project, oceanographic characteristics in Panglao Island will remain the same.

In the absence of the project, it is expected that the quality of the coastal water around the project site will continue to be affected by existing processes and domestic sources of pollution.

7.6 ATMOSPHERE

The air quality in the area is likely to remain practically unchanged since no significant source of air pollutants is expected to be generated in the project vicinity in the future. While vehicular traffic may increase slightly in the future due to natural population growth, increase of air emission is expected. Since the island has no many obstructions, the air movement can freely disperse air pollutants in the area.

Noise levels along the major highway will increase slightly due the slight increase in traffic volume associated with the natural increase in population.

7.7 VEGETATION

Within the next five to ten years, the composition and pattern of distribution of existing plant species will remain practically the same in the proposed airport site. Bushes and grasses will continue to dominate the terrestial vegetative cover of the area. Agricultural crops like corn and cassava is expected only during wet season due to lack of sufficient irrigation system in the area.

There may be some small scale clearing of some vegetative cover associated with the building of some residential houses and business establishments.

7.8 FISH AND WILDLIFE

Panglao Island is classified as a low diversity area. Wildlife identified in the previous study may diminish as activities in the area increases.

7.9 LAND AND RESOURCE USE

Agriculture,, particularly farming, has been losing ground during the decade. Farming has been constrained by unfavorable soil conditions, small farm sizes and declining farm area, hence the low productivity. The cutting of coconut is rampant in the island. If this continues, investment in agriculture will no longer be attractive and some owners may now give up their lands for other purposes.

Without the airport project, the area is likely to be converted to industrial and residential uses.

7.10 SOCIO –ECONOMIC ASPECTS

Without the project, population growth will be brought by natural increase and net-migration.

Fishing, despite its potential as a significant source of livelihood and income, has been and is likely to remain subsistence and small scale without intervention or assistance.

Unemployment rate was 6.7 percent in 1991 to 1993, went down to five (5) percent in 1995 but went up again to 6.8 percent in1996. The future trend is expected to be the same if no employment generating facilities will be established in Bohol or in the island.

Community infrastructures, and social services availability will tend to remain as in the existing condition.

SECTION 8 Prediction and Assessment of Impacts

8.1 GENERAL

Potential impacts during pre-construction, construction phase and the operational phase of the proposed airport project were identified and assessed.

Table 8.1
Predicted Impacts During Construction Phase and its Mitigation

Environmental Aspects	Impacts	Nature	Degree of Impact	Direct/Indirect
A. Physical/Chemical Effects				
Topography and drainage	Land subsidence /Alteration of natural drainage pattern that could lead to localized flooding / soil erosion	Negative	Minimal	Direct
Soil Quality	Soil contamination due to oil/fuel spill	Negative	Minimal	Direct
Air Quality	Potential increase of ambient TSP or dust concentration around project site Potential Increase of ambient NOx and SO2 concentrations from engine exhausts	Negative Negative	Significant Insignificant	Direct
Noise and vibration	Potential increase in noise levels around project site	Negative	Insignificant	Direct
Water Quality	Potential increase in sediment load Potential increase in BOD	Negative	Insignificant	Indirect

Environmental Aspects	Impacts	Nature	Degree of Impact	Direct/Indirect
	loading due to sanitary discharges	Negative	Insignificant	
	Possible oil contamination	Negative	Insignificant	Indirect
B. Ecological Effects				
Flora and Fauna	Loss of vegetation	Negative	Minimal	Direct
	Fish and wildlife Disturbance	Negative	Minimal	
C. Aesthetic and Visual Effects				
Aesthetic	No adverse impact on general aesthetics	Negative	Insignificant	Direct
D. Socio- Economic Effects				
Vehicular traffic	Possible congestion in narrow barangay roads.	Negative	Moderately significant	Direct
	Potential increase in risk of road accidents	Negative	Moderately significant	
Community Structure	Disruption of existing community	Negative	Insignificant	Direct
	Resettlement and Land titling	Positive and negative	Significant	Direct
Land Use	Alteration of land use and increase in land valuation	Positive	Moderately significant	Direct
	Decrease of space for agricultural land	Negative	Minimal	

Environmental Aspects	Impacts	Nature	Degree of Impact	Direct/Indirect
Employment	Availability of construction jobs to local residents	Positive	Significant	Direct/Indirect
	Increase in income	Positive	Significant	
Business	Increase in business receipts	Positive	Significant	Direct / Indirect

8.2 PRE -CONSTRUCTION / CONSTRUCTION PHASE IMPACTS

The two major development activities during the construction of the project are the construction of the access road and the airport facilities. Construction activities are expected to disturb the physical, biological and socio-economic environment of the impact zone.

8.2.1 Alteration of Natural Drainage

It is possible that the construction activities will obstruct the natural drainage pattern in the area. During construction phase especially in times of heavy down pours, the prevention of flooding in the proposed project area is necessary. Construction of drainage structures around the project site would allow efficient flow of surface runoff to natural drainage system.

8.2.2 Potential Soil Erosion

Any horizontal construction activities especially for site development will definitely cause some soil erosion. Without any mitigating measures, the amount of eroded soil will be significant during rainy periods on large exposed areas. Run-off water will transport soil particles that will result to siltation of water bodies in the project area.

8.2.3 Air Pollution

Expected air emission sources are from delivery trucks during hauling of construction materials and from the construction equipment used. However, magnitudes of these emissions are relatively small and could easily be dispersed by the wide air space in the site. Hence, the expected impact would be minimal. A moderate dust generation is expected during the dry season due to ground preparation and earthwork activities.

8.2.4 *Noise Pollution*

Operation of the various construction equipment will be the major source of noise generation during construction. The expected sound levels in dB(A) at various distances from these and other construction equipment are shown in **Table 8.2.** The DENR standards for noise in general areas are shown in **Table 8.3**. From this table, it can be seen that noise levels from most of the equipment attenuate to typical ambient levels at a distance of 240 meters and should pose no problem to nearby communities.

It is therefore expected that these noise levels will not be a nuisance to the public since there is a reasonable distance between the present residential areas and the proposed construction sites.

Table 8.3 - Expected Noise Levels from the Construction Equipment, dBA

Source	Distance from source (m)				
	15	30	60	120	240
Front Loader	75	69	63	57	51
Backhoe	85	79	73	67	61
Grader	88	83	78	72	66
Truck	91	85	79	73	67
Concrete Mixer	82	76	70	64	58
Crane	83	77	71	65	59
Generator	78	72	66	60	54
Compressor	81	75	69	63	57
Pump	76	70	64	58	52
Pile Driver	101	95	89	83	77
Jackhammer	88	82	76	70	64

Table 8.3 - DENR Standards for Noise in General Areas

Area	Maximum Allowable Noise Level, dB(A)		
	Daytime	Morning/Early Evening	Nighttime
School, Hospitals	50	45	40
Residential	55	50	45
Commercial	65	60	55
Light Industrial	70	65	60
Heavy Industrial	75	70	65

8.2.5 *Water Pollution*

During construction stage, about 500-700 skilled and unskilled workers are to be hired. At a generation rate of 50L/cap/day, with the assumption that the hiring will be 100% (700 workers) during the heyday of the construction period, the estimated domestic wastewater generation per day is about 35 cubic meter.

Water quality of the surrounding water bodies may be impaired due to the direct discharge of sanitary wastewater. Likewise, when the effluent from the septic system is discharged directly into the soil subsurface, it could migrate downward especially in areas of intensive groundwater pumping and declining groundwater levels. Without any mitigating measures, the direct discharge of this wastewater may cause short-term impact on water quality.

8.2.6 *Loss of Vegetation Cover*

Clearing and other required civil works to be undertaken in the project area during construction stage will result to vegetation loss. However, the impact is only minimal since the site is mostly covered by shrubs and grasses.

8.2.7 *Fish and Wildlife Disturbance*

It will not result in unwarranted hazards to endangered species. The project site and the areas proximate to it have no recorded endangered species, which could be affected by the construction and operation phases of the project.

8.2.8 *Vehicular Traffic*

Congestion in narrow barangay roads and at the entrance to the site will slightly increase due to the hauling of construction materials. However, the average daily trips will not be significant since the construction schedules will be spread over a long period.

Construction workers will add up to the existing number of commuters in the area. However, this will only occur during the early phase of construction. The workers will create temporary residence in the construction site that would minimize average daily trips.

Road accidents are expected to be moderately significant due to increase in the movement of delivery trucks coming to the project site.

8.2.9 Disruption of Existing Community and Displacement of People

The resettlement of more or less 50 households from the project site will alter population size and composition in the barangay if they are relocated outside of it. However, if the relocation site will be within the same barangay, there will be no demographic alteration of the barangay.

The impact of the displacement of the affected population will depend on the housing characteristics and distribution in the resettlement site.

8.2.10 Land Use

It will not make unwarranted accelerated use of scarce resources in favor of short-term over long-term economic needs. The project site is not considered a prime agricultural land or a primary forestland. Its use as an airport site that will generate greater benefits to the immediate and bigger community than its present land uses which are characterized as marginal/subsistence agriculture and unproductive grassland/shrub land.

8.2.11 Employment

The project can employ local residents during the construction phase. It can provide enough work to substantially reduce the unemployment in Bohol particularly in Panglao Island.

8.2.12 Business

Business opportunities like sari-sari stores are expected to crop up in the island due to influx of construction workers in the site.

8.3 OPERATION PHASE IMPACT

Potential impacts from the operation of the proposed airport will arise from the numerous activities related to airport operations. Normal activities such as aircraft takeoff and landing, movements of passenger and cargo vehicles to and from the airport complex, would affect the physical and biological environment around the site. More importantly, the development of the site would transform the land use in the area that could become a nucleus of growth and development.

The impacts of airport operations are summarized in **Table 8.4.**

Table 8.4
Predicted Impacts During the Operation Phase

Environmental Aspects	Impacts	Nature	Degree of Impact	Direct/Indirect
A. Physic-Chemical Impacts				
Erosion and sedimentation	Better control of erosion and sedimentation	Negative	Insignificant	Indirect
Water Usage	Increase water demand	Negative	Insignificant	Direct
Water quality	Potential contamination of water quality	Negative	Significant	Indirect
Air quality	Slight increase in ambient concentration of air pollutants	Negative	Insignificant	Direct
Noise	Noise pollution	Negative	Moderately significant	Direct
B. Ecological Effects				
Terrestial Ecology	Disturbance to wildlife	Negative	Insignificant	Direct/Indirect
C. Aesthetic				
Aesthetics	Improve the aesthetic appeal of the landscape	Positive	Significant	Direct
D. Socio- Economic Effects				
Population	Increase in population density	Negative	Minimal	Indirect
Labor and Employment and income	Availability of employment both at the airport and other business establishments that will open as a result of the airport Increase in family income	Positive Positive	Significant Significant	Direct/Indirect Indirect
Culture and lifestyle	Change in lifestyle and values	Negative	Moderate	Indirect
Basic Services	Improvement of basic services	Positive	Significant	Direct/Indirect

Environmental Aspects	Impacts	Nature	Degree of Impact	Direct/Indirect
Health and safety	Improvement of health and safety	Positive	Significant	Indirect
Land Use	Change of land use from agriculture to possibly commercial	Negative	Moderately significant	Indirect
Women	Increase earning capacity	Positive	Significant	Direct/Indirect
Traffic	No significant increase in traffic	Negative	Insignificant	Direct

8.3.1 Soil Erosion

Soil erosion during the lifetime of the project is expected to decrease and much lower than the present rate due to a shift of land use from agricultural. Implementation of the project would mean more covered areas and less soil to be exposed directly to rainfall. Erosion by overland flows will also be less since the entire development will be provided with lined canals and more paved areas.

8.3.2 Increase water demand

Increase in water demand is expected to be insignificant during the operation phase of the airport. Airline passengers stay for only about less than two (2) hours in the waiting area where small volume of water will be used.

8.3.3 Water pollution

There is a pollution threat to the water quality of the nearby coastal waters and groundwater from the waste generations of the proposed project. However, the impacts are considered minimal due to the relatively small amount of wastewater generations and the proximity of the surface water in the alternative sites.

8.3.4 Liquid Wastes

Sewage Treatment Plant (STP) is discharged into the drainage systems that contain nitrate, metals, bacteria, and viruses. These materials may have deleterious effects on the groundwater quality. The greatest concentrations of dissolved nitrates in deep groundwater zones are usually located beneath the densely populated urban areas. The effluent

could migrate downward especially in areas of intensive groundwater pumping and declining groundwater levels.

Without any mitigating measures, effluents from the STP will cause a long-term negative impact on the groundwater quality of the groundwater resources beneath the proposed residential areas. At full occupancy, the proposed airport project will generate the subsurface effluent disposal of some 90 m3/day. Though this figure is relatively small, without any mitigating measures, STP effluent will cause a long-term accumulation of nitrates in groundwater.

Another source of wastewater is the floor drains. Floor-drain wastes include routine floor washings and the occasional cleaning of spills. Normally, operating a mechanical equipment will generate some typical wastes, which are petroleum-based lubricants and fluids.

8.3.5 Solid Wastes

Solid wastes will normally be generated from the following: (1) material packaging and shipping, (2) office operations, and (3) routine maintenance. Packaging wastes are cardboard boxes and plastic wrappings. Waste office papers are usually mixed waste paper and computer paper. Routine maintenance will generate rags used in cleaning and maintaining equipment. Used oil filters are also generated occasionally. At full occupancy, the proposed airport project can generate about 500-1000 kg/day of combined/mixed solid waste.

Improperly managed solid wastes are health and environmental hazards. Rats, flies, and other disease vectors breed in open dumps. Improper management may also cause air and water pollution. The persisting bad odor may constitute a major environmental nuisance. Burning of solid wastes in the open will generate some gaseous and particulate matter causing air pollution problems. Leachates could contaminate the groundwater, while runoffs from open dumps will pollute surface water.

Without any mitigating measures, the solid waste generation could become one of the major long-term environmental problems.

8.3.6 Fuel Storage Tanks/Pipelines

Pollution or contamination from the routine use of the fuel storage tanks and fuel pipeline are not expected during routine operations since these systems are designed not to release their contents to the ground. However, the possibility of leakage should not be discounted. Hence, these aspects are discussed in the section for mitigating measures.

8.3.7 *Air /Noise Pollution*

Aircraft takeoff and landing, and movements of passenger and cargo vehicles to and from the airport complex, would affect the air quality and noise around the site. There would be a slight increase in ambient concentration of air pollutants in the area.

The project, with its attendant pollution control measures, will generate noise pollution at moderately significant levels only during takeoff and landing of planes. This noise impact could only be experienced by residents living within 300 meters away from airport. A more detailed analysis of noise pollution due to airport operation were presented in Annex G.

8.3.8 *Aesthetic*

Introduction of the proposed project has a significant beneficial impact on the aesthetics. It will foster latest concepts and most appropriate technology in land planning and site development.

8.3.9 *Increase in population*

The project will create both a permanent and transient population in the island. The permanent population will be about **67 workers** who will be employed if they all come from the outside. If they will bring their families with them in the site with at least three (3) members, this will mean an average of **268** additional permanent population. The presence of the permanent population will statistically after population size and the composition of barangay population as well as household size, dependency ratio and educational attainment.

The transient population will be the airline passengers who will be using the airport. At present flight load of the airport, there should be around 800 passengers using the airport everyday. Their presence will intermittently alter population size and composition but not the long-term population characteristics of household size, dependency ratio and educational attainment. Permanent impact will be realized if the business opportunities generated by the airport operation will invite in-migrants who will set up shops around the airport terminal.

8.3.10 *Improvement of basic services*

The basic services demand for road network will greatly increase during the operation phase of the project. The stretch between Tagbilaran City and the airport will take the heaviest toll.

8.3.11 Improvement of health and safety

With the improvement on lifestyle that can be catalyzed by the airport project, and the urbanization of the project area in general, the health and safety of the residents may subsequently improve. Because of development and economic capability of the residents, improvement on the basic utilities such as sanitized pipe drinking water, water-sealed septic tank and other basic health and sanitation facilities are expected to be effected in the project area.

8.3.12 Employment and income

With the improvement on lifestyle that can be catalyzed by the airport project, and the urbanization of the project area in general, the health and safety of the residents may subsequently improve. Because of development and economic capability of the residents, improvement on the basic utilities such as sanitized pipe drinking water, water-sealed septic tank and other basic health and sanitation facilities are expected to be effected in the project area.

8.3.13 Land use

It is expected that the values of the nearby areas will rise. In the near future, the domino effect of economic development that can be catalyzed by the proposed airport and other development projects in the project area may even felt not only in the immediate area of the project site but also in the nearby towns of Panglao.

8.3.14 Women

During the operation phase, the project offers work opportunities to women in the form of maintenance and security. This may move a number of housekeepers from the house to the work place. This has tremendous impact in terms of enabling women to earn their own money, ability to support their family and instilling a sense of efficacy.

8.3.15 Traffic

During operation phase, traffic in the area is expected to be insignificant. Flight schedules are expected not that crowded to create traffic in the road network.

SECTION 9

Contingency Plan

In the presence of any undesirable situation related to environmental disaster, emergency preparedness is therefore important. It is necessary that the proposed airport project formulated contingency plans for dealing with emergencies and should be made available to the administrator of the airport.

Generally, a hazard is defined as an inherent physical or chemical characteristic that has the potential for causing harm, while a hazard evaluation study is an organized effort to identify and analyze the significance of hazardous situations associated with a process or activity (AIChe, 1992).

The following probable environmental hazard that could be encountered in this project are as follows:

- Accident disposal of extremely hazardous substance
- Accidental fuel spills/leaks
- Fire
- Accident due to Seismic Activity
- Crash

At any event that the airport facilities accidentally disposed of extremely hazardous substances, as well as fuel spills/leaks, the Environmental Officer must:

1. Notify the DENR (required by RA 6969)
2. Submit plans on containment, decontamination, and disposal
3. Immediately issue notification of any release

Each incident involving the release of hazardous substance presents special problems. Response personnel must evaluate these problems and determine an effective course of action to mitigate the incident. The following phases are involved in safely responding to an incident: (1) site assessment, (2) site entry, and (3) site control.

Site assessment will include an evaluation for site approach to keep emergency control personnel out of the hazardous area until identification of the nature and degree of the hazards can be made and initial assessment completed. Important requirement in site entry are personal protective equipment and monitoring. The preliminary safety requirements will be based on the findings of the initial on-site survey and

reconnaissance, which may consist of more than one entry. Each situation will be examined individually since no method can select a level of protection in all unknown environments.

Control of the site is necessary to reduce the possibility of exposure to any contaminants present and contaminant transport by personnel or equipment. This may include the setting up of security and physical barriers to exclude unnecessary personnel from the general area and establishing control points to regulate access to work zones. Movement of personnel and equipment between zones and into the site will be limited by these control points.

Accident due to seismic activity could be lessened by employing earthquake proofing of structures. Structures/buildings within the project site shall be designed in accordance with the national building and structural codes and earthquake zoning of the area. Based on the earthquake zoning map prepared by PHILVOLCS and records of earthquake occurrence in the area, the engineering design of the structures should be equal to or greater than the maximum recorded earthquake and based on the geotechnical assessment of the site.

In the event of crash and fire, the airport operation manual prepared by the airport management should be followed. This manual must include 1) crash and fire rescue procedure, 2) security procedure, 3) inspection and maintenance procedures to ensure safe access to the runway and taxiways system, 4) procedures to ensure order and safety at the airside, 5) procedures to ensure security and convenience at the terminal, and 6) other pertinent maintenance procedure.

Air safety is the primary objective of airport management and operations, part of which is rescue and fire fighting that should be emphasized in the manual. The suggested content of the rescue and fire fighting plan should include the following:

a. Introduction: include airport foreword, content, and distribution of the plan, amendments and alarm principles.

b. Instructions: include airport owners, airlines, air traffic control, crash fire and rescue unit, hospital in the airport vicinity, local police authority, other relevant local authorities and post emergency procedures.

c. Alert Levels: include crash at known site, potential crash, possible crash at unknown site, procedures for identifying the crash site and list of aircraft and helicopters.

d. Alarming Lists: include telephone and address list and list of frequencies used in radio communications.

e. Maps: include regional maps, airport maps and airport layout chart.

SECTION 10 Environmental Briefings and Monitoring

10.1 GENERAL

Environmental briefings in this context are the information-education-communication plan that will cover the different phases of the project, from construction stage to operation phase of the project.

10.1.1 Pre-Construction / Construction Phase

Target Audiences during the construction phase are:

- Contractors
- Construction workers
- Member of the surrounding community

Objectives of the IEC during this stage are:

- Effectively disseminate information on the contractor's planned activities for the construction phase
- Provide awareness on the contractor's commitment for environmental protection and public safety
- Educate the community or inform the contractors and construction workers of the need to comply with government regulations on environmental protection, public health and occupational health and safety
- Educate the community on meanings of international signage, e.g. traffic signs, safety signs, hazard signs that will be installed in and out of the project site
- Inform the workers of the proper response to various occupational emergency situations

Communication tools that will be employed are:

- Barangay meetings
- Flyers
- Fact sheets or pamphlets
- Posters
- Emergency drills

- Contract (for site development and building contractors)

10.1.2 Operation Phase

The target audiences of the Information-Education-Communication Plan during the operation phase are:

- Airport employees
- Guest/ Businessmen
- Residents of the host barangays and adjoining communities

Objectives of the Information-Education-Communication Plan are:

- Reinforce the need for compliance with the conditions of the ECC
- Sustain and nurture environmental awareness among airport staff
- Promote occupational safety
- Inform community members and employees of the airport's environmental program
- Reinforce the communities' awareness for environmental protection

Communication tools that will be utilized are:

- For employees –manuals, meetings, trainings, lectures, seminars and drills
- For community members- community meetings, flyers, handouts

Proponent/airport authority has the option to implement IEC through a consultancy group or an NGO group specializing in this field. The other option is to organize the airport's environmental group and take advantage of the construction as a phasing-in period for the in-house environment office.

10.2 MONITORING

10.2.1 Pre-Construction / Construction Phase

Usually, construction phase impacts are short-term in nature. For this reason, monitoring plan during this phase of the project implementation may be carried out by checking the adherence of the contractor to fundamental engineering construction protocol. Likewise, an on the spot inspection of the contractors/constructor adherence to the mitigating measures indicated in this EIS can be checked.

10.2.2 Operation Phase

- *Groundwater Monitoring*

Contamination of groundwater is more serious than surface-water pollution because it is more difficult to detect in a timely manner, move more slowly, and requires special expertise to predict the path and rate of contaminant movement.

The presence of a fuel farm and storm water ponds necessitates the setting up of a groundwater monitoring system from an environmental perspective. Optimum sampling frequencies for groundwater will be determined by the water quality issues to be addressed. Normally, less frequent sampling of groundwater is needed due to long residence time and relatively slow rate of change in groundwater quality. Monitoring wells shall be installed near each storm water pond and the fuel farm.

- *Air Quality Monitoring*

Although air quality deterioration may not be completely attributed to the proposed airport project, it is suggested that a regular air quality-monitoring program be undertaken. The monitoring could be done once a year. Possibly, the location of the sampling points could be (1) one inside the airport property and (2) outside of the airport property some 500-1000 m away from the airport site, the location of which would depend on the expected prevailing wind at the time of sampling. The parameters that can be considered are as follows: Total Suspended Particulate (TSP), Sulfur Dioxide, Nitrogen Oxide and oxidants.

The summary of monitoring activities is reflected in **Table 10.1.**

Table 10.1 Summary of monitoring activities (Pre-Construction / Construction & Operation)

Parameter	Station	Frequency	Procedure	Applicable Standard	Annual Cost
Pre-Construction /Construction Stage					
Dust Deposition	Closest homes	Weekly	Visual inspection	Presence of heavy dust deposits	Nil
	4 stations 50 meters from site	Monthly during dry season	Gravimetric	DAO 14	
Noise	Closest homes	Monthly	Noise meter	DAO 14	P5000
	Closest homes	Weekly	Hearing	Disturbance	Nil
Color	Alona Kew Beach Resort	Monthly	Visual comparison	DAO 34	
TSS	Sampling stations	Monthly	Gravimetric	DAO 34	
Oil & Grease	Sampling stations	Monthly	Gravimetric Petroleum ether extraction	DAO 34	
Phenols	Sampling stations	Monthly	Chloroform extraction or stannous chloride	DAO 34	
COD	Sampling stations	Monthly	Azide modification	DAO 34	
BOD	Sampling stations	Monthly	Azide modification	DAO 34	
PH	Sampling stations	Monthly	PH meter	DAO 34	
Siltation	Sampling stations/Adjoining waters	Weekly	Visual inspection		Nil
Solid and liquid waste	Construction site	Monthly	Visual Inspection		Nil
Operation Phase					
TSP	Sampling stations	Quarterly	Gravimetric	DAO 14	
Noise	Survey of people within the critical noise zones	Quarterly for the first two years	Noise meter	DAO 14	P20,000
PH	Outfall &Downstream of outfall	Monthly	PH meter	DAO 34	

Parameter	Station	Frequency	Procedure	Applicable Standard	Annual Cost
	of outfall, adjoining waters	Quarterly			
BOD	Outfall & Downstream of outfall, adjoining waters	Monthly Quarterly	Azide modification (dilution technique)	DAO 34	
Oil & Grease	Outfall & Downstream of outfall, adjoining waters	Monthly Quarterly	Gravimetric Petroleum either extraction	DAO 34	
DO	Outfall & Downstream of outfall, adjoining waters	Monthly Quarterly	DO Meter	DAO 34	

10.3 IMPACT REPORTING

The proposed impact, monitoring, and reporting plans are intended for the continued observation and evaluation of the mitigated impacts during the construction and operation phases. The proponent will closely coordinate with the DENR with a quarterly environmental status report. The proponent will appoint an Environmental Coordinator.

10.3.1 Construction Phase

Soil erosion is the only significant adverse impact during the construction phase. Monitoring of the identified mitigating measures for control of soil erosion will be easy since construction activities will be within the property boundaries of the project proponent. The project proponent shall closely monitor its constructors if the mitigating measures are being implemented. In addition, the project proponent shall regularly inform the DENR on the progress of the construction activities. Any new environmental issues that will arise and associated with the project shall be referred promptly to the DENR.

10.3.2 Operation Phase

The proposed development will have some significant adverse impact to shallow groundwater resources, spill of grease and oil, etc. as described earlier. These impact will be monitored closely. Changes in the gro underwater quality will be one of the main targets of the observations. The use and protection of the groundwater are important issues for the monitoring activities. Issues related to industrial pollution, such as FSTs will be monitored closely.

- *Groundwater*

  The presence of wastewater treatment plants, FSTs and numerous individual septic tanks necessitates the setting up of a groundwater monitoring system from an environmental perspective. Optimum sampling frequencies for groundwater will be determine by the water quality issues to be addressed. Normally, less frequent sampling of groundwater is needed due to long residence times and relatively slow rate of change in groundwater quality.

- *Underground Storage Tanks (FSTs)*

  Undetected soil or groundwater contamination by a leaking FST system could become widespread, difficult, and expensive to correct. It is therefore important that all FSTs in the project site should have a good monitoring system. Regular testing and inspection of the tank and piping system will be done to ensure that leaks are prevented, or detected early. Accurate inventory records will be maintained and reviewed for possible signs of leakage from tanks or piping.

  Monthly monitoring includes: (1) automatic tank gauging, (2) vapor monitoring, (3) interstitial monitoring, and (4) groundwater monitoring. In addition, locations of all FSTs will be plotted in a FST monitoring map with the information on the following: (1) type and capacity of tanks, (2) piping system, (3) corrosion protection system, (4) stored liquid, and (5) testing and inspection frequency. Physical and chemical information of the stored liquids will be readily available.

- *Hazardous Materials*

  Section 26 of the DENR's DAO No. 29 (IRR of RA 6969) requires that the hazardous waste users and generators shall notify the DENR of the type and quantity of wastes used and generated on a quarterly basis, with information to include the type and quantity of the used and generated hazardous wastes. In addition, DAO No. 29 requires

the hazardous waste generator to develop an appropriate filing system to maintain documents necessary for demonstrating compliance with Title III of the regulations. It is therefore very clear that under the rules and regulations for hazardous wastes the DENR will closely monitor the potential source of these kinds of wastes. The airport administrator will also closely monitor these facilities and will keep copies of the report submitted to the DENR.

SECTION 11

Mitigating Measures

11.1 PRE-CONSTRUCTION/CONSTRUCTION PHASE

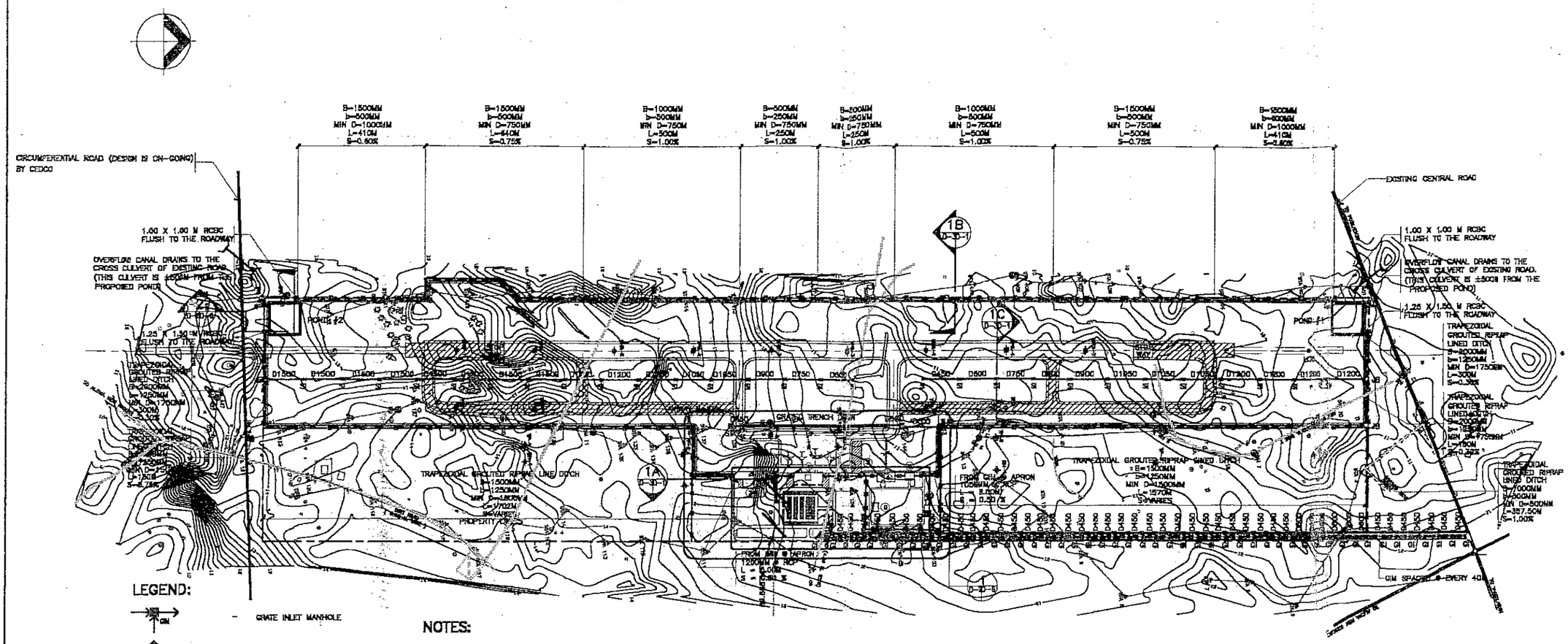
11.1.1 Alteration of Natural Drainage

Construction of drainage structures around the project site would allow the efficient run-off to natural waterways in the area. Generally, possible outfall of the storm water drainage system for Panglao Airport is the Panglao Bay. However, the runoff will be increased due to the development of the airport (new buildings and pavements will increase the runoff coefficient and there will be a change in the flow volume). The need for a bigger drainage structure to be laid out from the proposed site to the outfall at Panglao Bay is approximately 4.0km, which is not feasible and impractical to adopt. Efforts to make the drainage design system more practical and economical, provision of retention ponds was considered as a solution. Retention Pond No. 1 and 2 will be laid at outfall of each drainage system, which is located on both sides of the airport.

The sizes of retention ponds are designed by hydraulic calculations based on the parameters given to accommodate the runoff of Panglao Airport. In order to avoid flooding problems downstream, the outflow was controlled, so it can be carried by a 450mm Ø RCP and drain out to the nearest existing cross culverts with a distance of approximately 500m.

Internal drainage system shall be laid-out such that crossings on runway and taxiways are minimized to facilitate maintenance. Slopes provided in airstrip grades will be directed towards perimeter drainage (trapezoidal canal) outside the operation safety limits or within 3.00m from the security fence.

A system of pipe culverts shall be laid out for the internal roads to collect and dispose storm water from building facilities and road surface and is directed towards evenly spaced inlets. These drainage line generally discharges to the proposed retention pond draining towards the existing road drainage system, which is the circumferential road on the south and the central road on the north. Drainage plan for the project is shown in **Figure 11 –1.**



LEGEND:

- GIM – GRATE INLET MANHOLE
- GI – GRATE INLET
- SI – SURFACE INLET
- TRAPEZOIDAL LINED DITCH ALONG PERIMETER FENCE
- ø RCP – REINFORCED CONCRETE PIPE (NO. DESIGNATES SIZE OF PIPE)
- JB – JUNCTION BOX
- REINFORCED CONCRETE BOX CULVERT (NO. DESIGNATES SIZE OD CULVERT)

NOTES:

1. SURFACE INLETS SPACED @ EVERY 120M. GRATED INLET MANHOLES SPACED @ EVERY 40M.
2. ALL CROSS PIPES ARE 300MM ø RCP WITH MAX. LENGTH OF 20M AND MIN. LENGTH OF 10M. AND A MAX. SLOPE OF 1.5%
3. FOR DRAINAGE LAYOUT @ APRON REFER TO SHEET D-2.
4. FOR DETAILS OF TRAPEZOIDAL GROUTED RIPRAP LINED DITCH ALONG PERIMETER FENCE AND OTHER DRAINAGE STRUCTURES REFER TO SHEETS D-4 & D-D-5.
5. FOR DETAILS OF DISCHARGE OUTLET OF PROPOSED PIPE CULVERT TO TRAPEZOIDAL DITCH, SURFACE DRAINAGE ALONG PERIMETER FENCE AND SURFACE INLET AT LOCATED AT TURFED AREA REFER TO SHEET D-3.

FIGURE 11-1 DRAINAGE LAYOUT PLAN

11.1.2 Soil Erosion

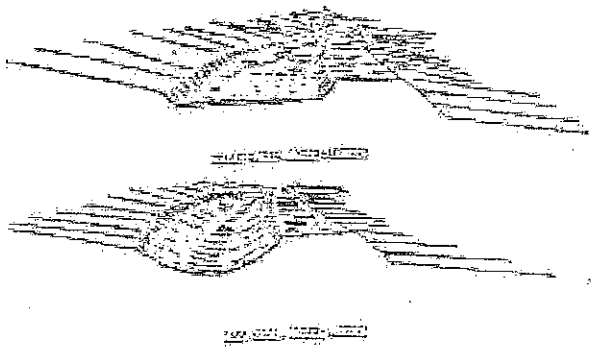
Soil Erosion during rainy days of the construction periods is unavoidable. However, this can be controlled by the use of structural erosion prevention and sediment control practices, which will divert the storm sewer flows away from the exposed areas, prevent sediments from moving offsite, and reduce the erosive forces of runoff waters. These may include the following: (1) interceptor dikes, (2) pipe slope drains, (3) straw bale barrier, (4) sediment trap, and (5) temporary sediment basin. **Figure 11 -2** illustrates the different structural erosion prevention and sediment control.

Interceptor dikes are generally built around the perimeter of a construction site before any major soil disturbing activity takes place. Pipe slope drains reduce the risk of erosion by discharging runoff to stabilized areas. This is effective before a slope has been stabilized or before permanent drainage, structures are ready for slope for use. A straw bale can be used as a temporary sediment barrier by placing them end-to-end in a shallow excavated trench. The sediment trap is appropriate for sites with short time schedules. It is formed by excavating a pond or by placing an earthen embankment across a low area or drainage. A temporary sediment basin is a settling pond with a controlled water release structure used to collect and store sediment produced by construction activities.

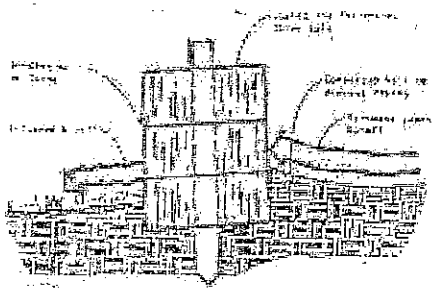
Cut-and-fill areas should be planned carefully to minimize soil erosion. A series of drop weirs may be constructed in the surface drainage channels to slow down runoff water reaches the final discharge point or the recipient waters, in this case, the coastal waters. Measures to temporarily stabilize the cut-and-fill areas should be undertaken by the contractors, more particularly if construction period falls within the rainy season. Land preparation and earth moving and piling activities should, as much as possible, be scheduled during the drier months. Most importantly, permanently exposed area should be resurfaced and re-vegetated to arrest and prevent erosion.

11.1.3 Dust Generation Control

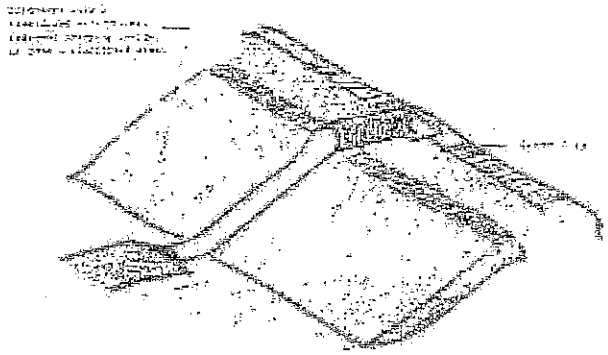
Common to most construction is dust generation, which persists only during the first few months of site development. It can easily be controlled by regular sprinkling the exposed areas with water. Strict implementation of dust control is necessary since the wide unobstructed air space of a flat landscape is favorable for dust transport. Spraying with used oil for dust control should not be allowed since it will contaminate the ground.



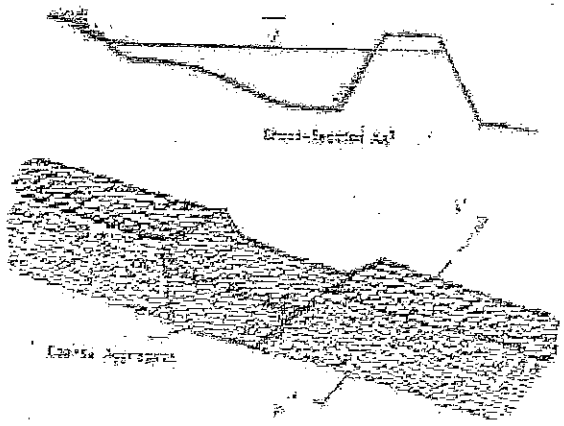
Typical Interceptor Dikes and Swales



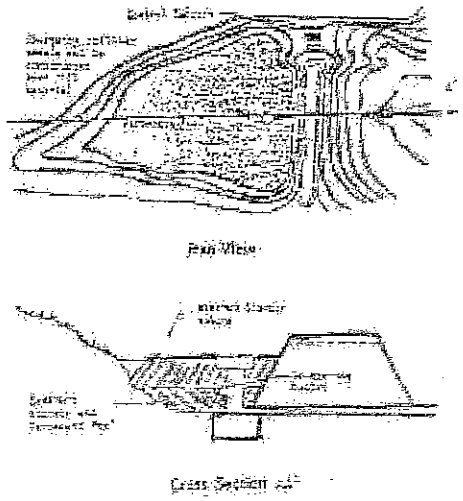
Flexible Slope Drain



Cross Section of Installed Straw Barrier



Typical Sediment Trap



Temporary Sediment Basin

FIGURE II-2

SOIL EROSION CONTROL MEASURES

11.1.4 Control of Noise Generation

Noise generating construction activities should be scheduled during daytime. Heavy equipment used should be maintained regularly. Movement of vehicles and equipment should be controlled within the project site.

11.1.5 Greening of the Project Site to Improve Aesthetics

Careful grading and clearing of the site must be done, making sure that special features like hills are not graded down, removed or flattened, but rather preserved and even enhanced.

The clearing of the site must also be properly supervised so that coconut trees and other fruit-bearing trees, vegetation cover and other landscape elements can be preserved if possible.

Planting of grasses and tree, and other ornamental plants in open spaces intended for greening purposes is desirable. The purpose is to enhance the aesthetic appeal and as noise screens and wind barriers of the project area.

11.1.6 Resettlement

Once the issue on exclusion of the airport site from Proclamation No. 2152 has been settled and necessary permits and clearances have been secured, the implementation of the resettlement plan could already be pursued.

A detailed resettlement plan should be followed. The plan should address the issues, which are normally raised by the settlers but are overlooked by concerned agencies undertaking the resettlement.

The existing residents of the area should be given just compensation and the government must be able to provide them several options for the relocation of their individual or group settlements. These measures are necessary to prevent the dislocated families from becoming illegal settlers or squatters and to provide them better source of livelihood.

Offer the farmers a good price for their land although it will be difficult to re-compensate them for the sentimental value of their land, which remains priceless. An information campaign would also be necessary to explain the benefits of the project to the landowners in the area. This is important step for the project to gain acceptance and support by the affected families and the general constituency.

The start of the construction should be made before the planting season and after the harvest season. This will minimize the value of the crop damage, which may be incurred. If the site clearing will be made, it must be in the staggered basis and done only in areas , which will be immediately developed. This will further reduce crop damage. Besides, it will enable the farmers recoup their farm investment and can decide to work on the project while the fields unaffected by the project are left to follow.

11.1.7 Compensation of Crop Damages

Before and/or during construction phase, crops, which may be affected by the activities, will be assessed and appropriately valued. Crop valuation may be based on prevailing market rates or as prescribed by the Assessor's office. This process will be jointly undertaken by Bohol Provincial Government and respective LGUs, the farm owners, and a third party.

11.1.8 Traffic Plan

Rerouting of the national highway and the creation of a new road become necessary. The national highway should be realigned with a safety spatial margin from the runway to avoid any untoward accidents, particularly runway overrun by aircraft.

Immediate opening of alternate routes, the creation of temporary roads to ease the traffic burden during airport construction, and the completing construction of the rerouted national road at the soonest time possible.

11.1.9 Workers and Public Safety

In order to ensure the worker's safety during construction stage, the project proponent and its commissioned constructor adhere to the Department of Labor and Employment Occupational Safety and Health Hazard Standards with particular emphasis on the following:

1. Personal protective equipment (Rule 1040) which specify the use and type of eye and face protection, respiratory protection, hand and arm protection, safety belts life lines and safety nets, safety shoes.

2. Personal protective equipment (Rule 1040) which specify the use and type of eye and face protection, respiratory protection, hand and arm protection, safety belts life lines and safety nets, safety shoes.

3. Personal protective equipment, and minimum space requirements for gar, electric welding and cutting operations (Rule 1100).

4. Fire protection and control rule (Rule 1940).

5. Notification, record-keeping requirements (Rule 1050).

During the construction phase when earth-moving activities are undertaken, markers aimed at warning people against going into or near the construction site should be installed. The markers should prevent accidents caused by moving machinery or altered terrain. During the operation phase, similar markers must be installed in critical and hazardous areas. A fence to deter intruders may have to be installed in these areas.

11.1.10 Local Labor Employment

Prioritization of local labor for employment will maximize the positive impact of the project. Priority in employment may be given to those households whose properties will be negatively affected by the project. The employment of any of their household members can be part of the compensation package.

Beneficial impact on local labor employment will be enhanced by requiring the contractor to give priority to the local workers in hiring the required non-skilled construction work force. This will effectively reduced the possible increase of population due to the in-migrant workers. Close coordination between the constructor and the local officials will be made.

If manpower pool in the barangays hosting the airport will not suffice to meet the requirements of the project, recruitment may be done from among the labor force in the adjacent barangays. In this case, it will make the provision of housing and utilities to outside workers unnecessary because they are just living nearby. The result is reduced construction cost to the project.

If the project management must bring in workers from outside, the housing and utilities must be provided to these workers. This will prevent the creation of unsightly housing units, which the workers may construct for temporarily use and the competition for social services with the local population. The coming in of workers from outside without the proper utilities will make the existing sanitation level worse.

11.2 OPERATION PHASE

11.2.1 Extraction of Ground Water

Extraction of groundwater according to its rate of recharge and tapping other sources of water to supply the airport's requirement should be regulated. Piped water from Tagbilaran is a feasible solution to this problem. Other recommendations are found in the Water Resources Investigation and Geo-Resistivity Survey, **Appendix XII.**

11.2.2 Wastewater

Accumulated oils and chemicals carried by surface runoff can be controlled by diverting the polluted waters into a retention pond. Sanitary wastes generated in the airport will be treated in the Sewage Treatment Plant (STP).

The influent and effluent characteristics and the processes involved for STP are described as follows:

- *Influent Characteristics*

Biochemical Oxygen Demand, BOD5	250	mg/l
Chemical Oxygen Demand, COD	500	mg/l
Total Suspended Solids, TSS	250	mg/l
Total Kjeldahl Nitrogen	60	mg/l
pH	6.5-8.5	mg/l
Oil and Grease	50	mg/l
Wastewater Temperature	18-20	Celsius
Ambient Air Temperature	18-22	Celsius

- *Effluent Characteristics (DAO 35, DENR Effluent Standard)*

Biochemical Oxygen Demand, BOD5	<20	mg/l
Chemical Oxygen Demand, COD	<80	mg/l
Total Suspended Solids, TSS	<30	mg/l

Total Kjeldahl Nitrogen	<5 mg/l
pH	6.5-9.0mg/l
Oil and Grease	<5 mg/l
E. Coliform	<100 Count/100 ml

➢ *The Process*

The sewage treatment process is the Sequential Batch Reactor ICEAS Modified. The following describes the process in the conventional activated sludge process. It comprises the primary, secondary, and post treatment.

- *Primary Treatment*

Screening – process separating the coarse material from the sewage being treated.

Collection/Equalization Tank – where the concentration of the pollutants are stabilized/homogenized through the introduction of air, which results to partial BOD removal.

Primary Clarifiers – process allowing the settleable solids to fall at the bottom of the tank and the lighter material to float on the water surface. This is part of the SBR/ICEAS Basin).

- *Secondary Treatment*

Aerobic Biological Treatment – process where wastewater mixes with biodegradable organic constituents and some metallic inorganic constituents.

Anaerobic Digestion – process that treats waste with moderate to high pH, non-halogenated hydrocarbons, moderate to low organic loading, and low to zero biological oxygen.

- *Post Treatment*

Chlorination – disinfects the effluent prior to discharge.

Filtration – a biological and/or physical treatment consisting of a bed of granular, usually sand, through which the effluent from an aerobic unit produce a high quality effluent.

The SBR/ICEAS is a modified activated sludge sequential batch reactor process. As shown in the process flow diagram, sewage after being pumped from the lift station continuously flows into the pre-react chamber where BOD5 is adsorbed into the biomass. The pre-react chamber acts as an organic selector, increasing the efficiency of the system and preventing the accumulation of filamentous organisms.

The partially treated waste then flows under the baffle wall to the main chamber. When air is on, the adsorbed BOD5 is further oxidized. When air is off, the remaining adsorbed BOD5 is carried to the bottom of the basin and is retained in the sludge blanket for final oxidation during subsequent aeration phases in low load periods. When the sludge is in the settled stage, treated effluent is ready for decanting.

Treatment is further enhanced by the intermittent operation of the ICEAS system. Each intermittent cycle consists of:

- Aeration Phase: BOD5 oxidation and nitrification occurs.
- Settlement Phase: Further BOD5 oxidation, settlement/clarification, and denitrification occur.
- Decant Phase: The treatment plant continues BOD5 oxidation, clarification, and denitrification, and automatically decants highly treated, clear effluent.

The end of phase three, the ICEAS cycle is repeated with the start of aeration. When parallel ICEAS basins are involved, one tank is in the settlement or decant phase. As the cycle continues, the tanks switch phases after a set duration. Wastewater continuously enters the aerating tank and effluent is discharged intermittently from the decanting tank.

The process flow diagram is shown in **Figure 11 –3.**

11.2.3 Solid Wastes

The airport management will employ the integrated solid waste management system by setting its solid waste management goals and objectives and then selecting and applying the suitable techniques, technologies, and management programs to achieve those goals and objectives.

The airport management may practice zero-waste management. Solid waste shall be sorted. Biodegradable wastes shall be composted, recoverable materials will be recovered for recycling and reuse. Those

materials that are non-biodegradable and non-recyclable shall be collected by a collection vehicle and will be disposed of in a landfill. Collection shall be done on a regular daily basis. Wastes collected will be temporarily dumped into the dumping site until the proposed provincial landfill is recommended once it is operational. The landfill shall comply with the proper design and specifications.

11.2.4 Fuel Storage Tanks

Fuel storage tanks (FSTs) will be provided with appropriate technologies to prevent or minimize the risk of fires or explosions. Tank construction materials will be strong enough to support large volume of materials while also chemically resistant and will be tested for strength before they are placed in service.

The tanks will have at least the minimum required systems for leak detection, corrosion protection, and spill overfill prevention. FSTs will be tested to determine the tightness of the tanks and piping system by pneumatic or hydrostatic methods. A protection system against corrosion is necessary for metals to prevent piping or tank failures.

Containment systems for releases from FSTs represent the second line of defense against the propagation in soil or groundwater contamination. They also enhance the effectiveness of early-warning leak-monitoring systems by confining the release prior to its detection. Secondary containment is a method to monitor, collect, and remove accidental releases of flammable fuels from a FST and piping network.

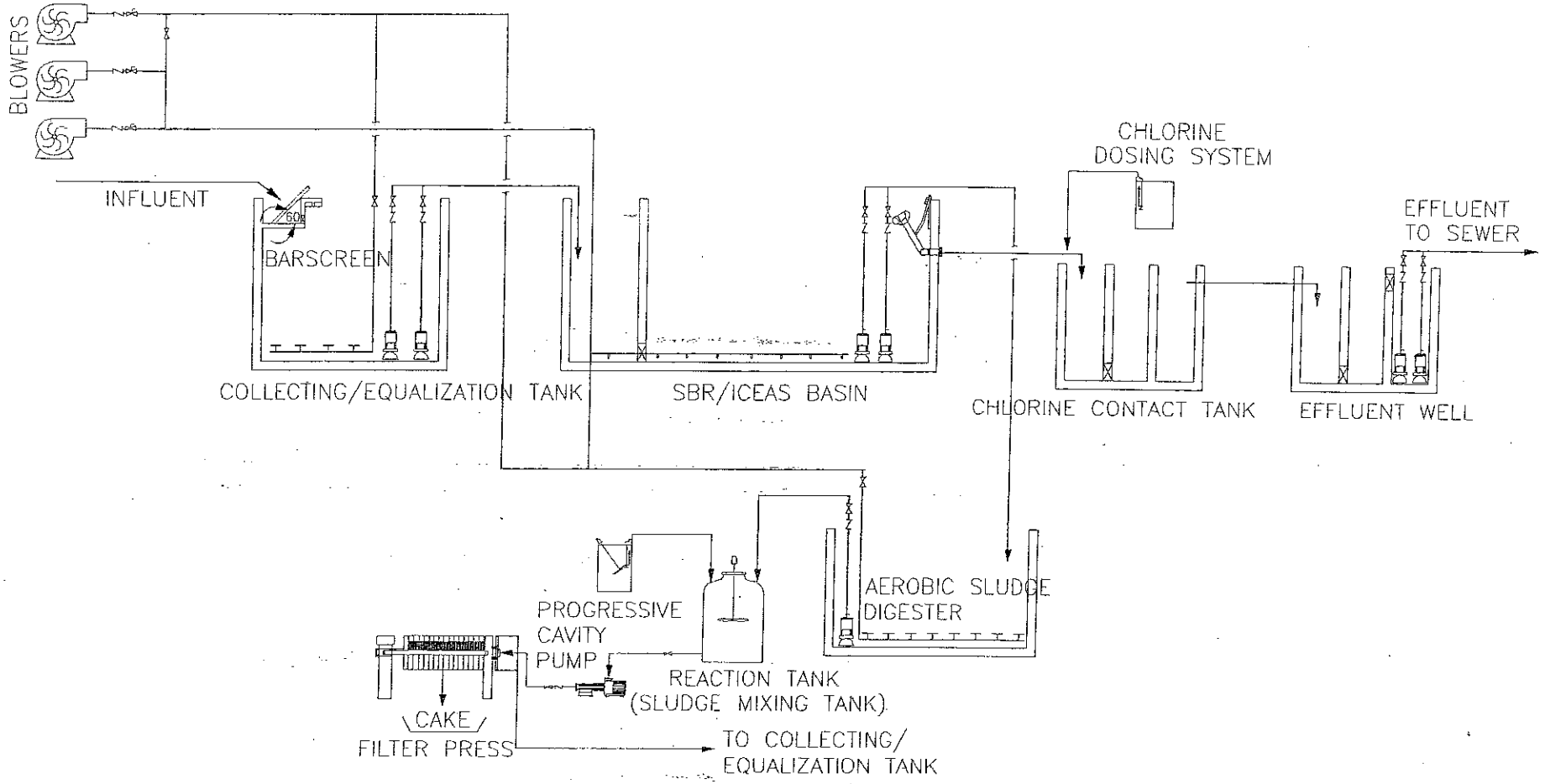
11.2.5 Oil –Water Separator

Oil and other non-miscible compounds in the runoffs can be removed efficiently using oil-water separators. A good example is the corrugated plate separator used in industrial facilities (Lipton and Lynch, 1987).

11.2.6 Control of Air Pollution

The most probable sources of air pollutant are cars and aircraft. From the point of view of regulation, these sources of air pollution are very difficult to control and regulate. The control is already beyond the authority of the airport management or the proponent.

In case of aircraft, the advents of new aircraft models whose efficiency of fuel burning is much better than the old one could help minimize the generation of air pollutants.



PROCESS FLOW DIAGRAM

FIGURE II-3

In the case of cars, emissions are very much dependent on the type of vehicle and the type of fuel they are using. With the government efforts to ban leaded gasoline, the emissions of lead particulate will surely minimize. However, the emissions of sulfur oxides, nitrogen oxides and particulate from cars/vehicles using diesel as fuel may not really help in minimizing the generation of air pollutants. The best that the proponent can do is to coordinate with the concerned authority on how to effectively and strictly implement the anti-smoke belching campaign of the government. The assistance of the local government officers will surely help in the implementation of such a program.

11.2.7 Control of Air Pollution Sources Other than Cars and Aircraft

In case the airport project will install equipment or facilities, which are possible, sources of air pollutants (i.e. boiler, incinerator, etc.), all these facilities with emission sources will comply with the air quality standards (DENR Administrative Order No. 14: Revised Air Quality Standards of 1992). Air pollution control devices will be installed. In case of boilers, for instance, the facilities will use a fuel with low sulfur content and install a smoke stack with the appropriate height and dimensions that could reduce the expected ground level concentrations to acceptable levels. A properly designed stack will surely comply with the requirements. In addition, all oil-burning equipment will be provided with heaters capable of heating oil to a temperature appropriate for the oil and burner.

11.2.8 Control of Noise Generation

The disturbance caused by the noise pollution could be minimized by scheduling the arrival and departure of flights during late the late morning and afternoons. Nearby residents who will most likely be affected by the airport operations and be exposed to its hazards could be relocated. A Noise Abatement Line or open space could be established and a green buffer zone could be created surrounding the airport and shielding the adjacent residential areas. Residential land use and their expansion could be planned outside of the delineated airport zone to minimize accidents and prevent noise pollution in the residential areas.

11.2.9 Implementation of Pro-Active Pollution Prevention Program

Pollution Prevention shall be employed by developing appropriate waste minimization alternatives. By minimizing wastes prior to treatment, a facility can reduce the amount of waste entering the end-of-pipe treatment units.

11.2.10 Increase Demand on Road Services and Parking vis-à-vis with Traffic Generation

The proponent will prepare a comprehensive and integrated vehicular traffic plan that will address the traffic circulation-related impacts such as travel time, degree of congestion, public transit accessibility, and traffic safety.

SECTION 12

Residual /Unavoidable Impacts

The adverse residual impacts associated with the construction period are not alarming as these will be temporary and on manageable levels. Strict implementation of the erosion prevention and sediment control methods during rainy days and dust control during the dry season will keep the problems in manageable levels. Residual magnitudes of the mitigated adverse impacts during the operation phase will also be at acceptable levels under strict implementation of the mitigating measures. Diligent monitoring will ensure that these levels will be maintained.

SECTION 13

Information Deficiencies

In addition to data gaps and limitations of the Assessors in the Preparation of EIS, as reflected in Chapter 3 of this EIS Report, the following information deficiencies were noted as follows:

- The Resettlement location plan and cost for the relocation of affected residents of Panglao and farmers in the project site.

- Updated inventory of plant and wildlife species in Panglao Island.

  Secondary data which was generated by SEASTEMS, INC. in 1999 was used in the study in addition to rapid assessment conducted since there is no major development that takes place in the area.

- Engineering Geological and Geohazard Assessment (EGGAR)

- Solid wastes Disposal System

- Probability of the occurrence of significant environmental hazards; plans for detection; plans for environmental rehabilitation.

- Maps showing location of houses and other establishments to be relocated or affected by the project.

SECTION 14

List of Data and References Used in the Study

1. AM Geoconsult & Associates, 2000, "Geotechnical Study for Panglao"

2. City Planning and Development Office, City of Tagbilaran. 1999. "Medium Term Development Plan –Year 1999 to Year 2004"

3. CRL Environmental Corporation. 2000. "Ambient Air Quality Monitoring at Panglao, Bohol"

4. DENR Administrative Order No. 14 Series of 1993, Revised Air Quality Standards of 1992, Revising and Amending the Air Quality Standards of 1978

5. DENR Administrative Order No. 35 Series of 1990, Revised Effluent Regulations of 1990, Revising and Amending the Effluent Regulations of 1982

6. DENR Administrative Order No. 26 Series of 1991. Amending Memorandum Circular No. 02, Series of 1981: Appointment/Designation of Pollution Control Officers

7. EMB-DENR Integrated Environmental Management for Sustainable Development (IEMSD) Programme.1997." DENR Procedural Manual for DAO 96 –37, Initial Version"

8. Intertek Testing Services. 2000. Test Report

9. Municipality of Dauis and Panglao, Socio-Economic Profile of Dauis and Panglao.

10. PAGASA. 1992. "Source for Climate Map of the Philippines"

11. Diona, Lina, 2000, "Perception Survey Results"

12. PHIVOLCS "Seismicity Map"

13. SEASTEMS.INC. 1999. " Ecoprofile of Panglao"

14. SEASTEMS, Inc. 1999, " EIA Draft Final Report on the Panglao Island Tourism Estate Project"

SECTION 15

Consultation and Comments Including Public Recommendations

Comments and recommendations regarding the proposed project were garnered on different occasions. Highlights of the scoping sessions and meetings conducted are tabulated below. Details are documented in the Scoping Reports and Minutes of meeting appended in this Environmental Impact Statement.(EIS). (See **Appendix III**).

Date/Venue/Activity/ Attendees	Comments
• July 10, 2000 • EMB, Banilad, Mandaue • First Scoping (Technical) Session • EMB, TCGI CVPDCC, DENR	Review Fund, Monitoring Fund, Environmental Guarantee Fund should be allocated; EGGAR must be prepared; check CARP appropriations; Proposed site be legally converted to commercial/industrial use; local people must be given priority to any job opening in the implementation of the project; people be resettled properly; proper disposal of solid and liquid wastes be incorporated in the design; collection of solid wastes must be coordinated with concerned LGU; Mr. Arranguez advised proponent/consultant to conduct second scoping session(public consultation) at the project site.
• October 3, 2000 • DOT Auditorium • 3rd PITE Inter-Agency Task Force Meeting • DOT,CVPDCC, TCGI,SEASTEMS, DENR,DPWH	Review & approval of minutes of previous meeting re: Upgrading of Tagbilaran Airport since PAL is not servicing there at present due to short runway for B737; Funds will be provided by CVPDCC to Provincial Government of Bohol re: site acquisition; for re-classification of Panglao Island, the DENR has drafted Amendments for Proclamation No. 2152
• August 18, 2000 – • PanglaoMunicipal Library & Session Hall • Second Scoping Session • CVPDCC, TCGI, LGUs, Gov. Relampagos, Residents of	The sociologist stressed that the people of Bohol Province supports the project as per result of survey conducted. Issues raised: Fears of Plane Crash, dislocation, loss of income source, popular indifference brought by the delays in the implementation of the project-Gov. Relampagos cited that the preparation of the Feasibility Study of the airport project is the first and only study being done; The one which U.P. Planades undertook, was a Pre-Feasibility Study of Panglao Airport and does not in particular define its

Date/Venue/Activity/ Attendees	Comments
Residents of Tawala, Resort Owners	economic and financial viability, nor consistent with the requirements of NEDA-ICC and the proposed Funding Agency; he gave emphasis on the importance of an airport development of the region. Vice Mayor Benedictio Alcala requested for a third scoping session since lot owners and beach operators affected by the airport development were not properly represented. He also clarified why the alignment of the proposed airport at Dauis differ from the two other proposed sites.Mr. Ferrolino of TCGI explained that alignment of an airport always follow the prevailing wind direction.
• September 14, 2000 • Panglao Parish Church • Third Level Scoping Session • CVPDCC, TCGI, Residents, Resort Owners, LGU	Issue on displacement and dislocation- layout plan shown and explanation gave some degree of relief to the affected residents; Possibility of land swapping - Gov. Relampagos assured this will be looked into; Complaint on Low Purchase Price-Governor shall leave the matter to a committee; Issue on employment-Gov. assured the people of Panglao as indicated in the Local Govt. Code ; President of tricycle association hailed the project as a boost to their income; Request of residents on Land Titling-Gov. mentioned the need of a repealing decree since Panglao is a protected zone.
• January 11, 2001 • CVPDCC Office • Coordination Meeting for the Application of ECC • CVPDCC, TCGI, DENR-EMB Representatives Dir. Alan C. Arranguez and Mr. Mar Tabuco	The Environmental Impact Statement for Panglao and Bais Airport were presented to Dir. Arranguez and Mr. Tabuco. The following additional informations were requested: • LGU Certifications • Sangguniang Barangay Resolutions • Mechanisms to be followed in turning-over of responsibilities in the operation of the airport • Wastewater Treatment Facility and Cost • Solid Wastes Disposal System • Exclusion of Panglao Airport Site in Proclamation 2152 • Resettlement Plan including cost • Drainage Plan • Genset, if required • MOA re: Review Fund • EGGAR
• February 6, 2001 • DENR-EMB Compound,	Initial comments were given by the REVCOM. These are as follows:

Date/Venue/Activity/ Attendees	Comments
Banilad, Mandaue City • First Meeting with the REVCOM • CVPDCC, DENR, TCGI, PCAPI, REVCOM Members	• Revise EIS in accordance to the Annotated Outline provided by the REVCOM • Arrange properly the paging • Address properly the sources of data used in the study • Provide a drainage plan • Provide additional maps • Water/Geo-Resistivity Study • Wastewater Treatment • Solid Waste Disposal System • Locational Clearance • Resettlement Plan and Cost • Exclusions from PD 2152 • Resolutions • DAR Certification • Social Acceptability be strengtened • Biodata of EIA Preparers

15. Schema Konsult Inc., 1998. "Environmental Impact Statement of New Bacolod Airport, Bacolod"

16. TCGI Engineers. 2000. "Feasibility Study of the Proposed Panglao Airport"

17. TCGI Engineers. 2000. "Noise Modeling for Panglao"

18. WATCON, Inc. 2000. "Hydrological and Geo-Resistivity Survey for the Proposed Panglao Airport"

APPENDIX I

ACCOUNTABILITY STATEMENT OF EIS PREPARERS

APPENDIX II

EIS PREPARERS' (CV)
CURRICULUM VITAE

Proposed Position	**Team Leader**
Name	**LUIS I. MALLONGA**
Date of Birth	June 20, 1956
Nationality	Filipino
Education	Earned units in Advance Numerical Methods, Plastic Design of Steel Structures, Prestressed Concrete Design and Foundation Engineering for MSCE (Major in Structures) at the University of the Philippines. Bachelor of Science in Civil Engineering University of the Philippines, 1978
Professional Registration	Registered Civil Engineer, 1979, No. 21873
Honors/Awards	2nd Honor, Don Bosco Technical Institute, 1969 National Science Development Board Scholar, 1969 - 1973 GSIS Scholar, 1973 - 1978
Languages	English - Fluent Filipino - Fluent
Professional Training	CAST '98 Concrete Art, Science and Technology, ASEP/PICE, May 1998 Eight ASEP International Structural Engineering Convention, May 1999 CAST '2000 Concrete Art, Science and Technology, ASEP/PICE, May 2000 Philippine Construction Technology Forum (Phil. Contractor's Association) Nov. 1998 Seventh ASEP International Structural Engineering Convention, "Facing the Challenge of Economic Growth", Manila Midtown Hotel, May 15-17, 1997 Fifth Biennial International Structural Engineering Conference, ASEP, May 1992 Seminar on "July 16, 1990 Earthquake-A Year After", ASEP, July 26-27, 1991 Symposium on Post Earthquake Information, ASEP, August 1990

Analysis and Design of Bridge Structures, ASEP, December 1987

Seminar on "Structural Steel Shapes and Sections", ASEP, December 1987

Analysis and Design of Steel Structures, ASEP, August 1987

Design of Road Pavement in the Philippines, PICE, 1985

Construction Management, Executive Development Academy, 1984

3rd National Structural Engineering Convention, 1983
FORTRAN IV Programming, Computech, 1982

Basic Language Programming, Computech, 1982
Nature, Engineering Characteristics and Field Testing of Natural Soils related to the Design of Engineering Structures, AIT / ASEP / PICE, 1982

Advanced Reinforced Concrete Design, ASEP/PICE, 1981

Strength Design of Reinforced Concrete, 1980

Seminar on PERT/CPM, D.M. Consunji, Inc., 1979

Special Skills

Use/Application of the following computer programs:

- Excel
- Microsoft Word
- ISDS/STADD III
- ETABS

Membership in Professional Association

Director, Association of Structural Engineer of the Philippines-1997 - 2000

Member, Association of Structural Engineers of the Philippines

Director, Association of Structural Engineer of the Phils., 1992-1993

Member, Philippine Institute of Civil Engineers (Makati Chapter)

Member, U.P. Alumni Engineers

Member, U.P. ACES Alumni

Employment Record

May 1997 to Present	TCGI ENGINEERS **Assistant Vice President/Director of Projects**
March 1990 to April 1997	TCGI ENGINEERS **Section Head, Structural Section/Project Manager**
Oct. 1988 to March 1990	ECONOMIC SUPPORT FUND SECRETARIAT **Acting Manager, A & E Division, Technical Services Group**
July 1986 to Oct. 1988	FOUNDATION SPECIALISTS, INC. **Civil-Structural Engineer**
March 1985 to July 1986	**Practicing Civil-Structural Engineer**
June 1982 to March 1985	DESIGN MANAGEMENT AND DEVELOPMENT CORPORATION **Project Manager/Senior Structural Engineer**
June 1980 to Jan. 1985	DESIGN MANAGEMENT AND DEVELOPMENT CORPORATION **Senior Civil-Structural Engineer**
Nov. 1979 to June 1980	F.R. ESTUAR AND ASSOCIATES **Structural Design Engineer**
Oct. 1978 to Nov. 1979	D.M. CONSUNJI INC. **Field Engineer**

Professional Experience

May 1997 to Present

VARIOUS PROJECTS
Director of Projects

Responsible for the operation of various projects of the company in providing engineering design and construction management services. These services consist of:

- concept development and planning
- field investigation such as topo survey and other surveys
- detailed design consisting of design calculations preparation of drawings, specifications, cost estimates, etc.
- preparation of tender documents
- conduct of bidding which consists of selection/prequalification of contractors, issuance of bid documents, evaluation of bids and recommends award of contract
- construction supervision and post construction phase
- other services which the client may require

Projects Undertaken:

CVDP-CENTRAL VISAYAS AIRPORTS
Bais and Panglao

The project involves the feasibility study of development of two airports in two separate locations, Bais City, Negros Oriental and Panglao, Bohol.

FERNANDO AIR BASE
Lipa, City

Master Planning and preparation of conceptual designs for existing military airbase which will be converted to General Civil Aviation and Cargo for BOT proposal.

SBMA-RIZAL AVENUE BRIDGE
Subic Bay, Olongapo City

The project involved the construction of a 82-m long bridge with side walk between Olongapo City and Subic Bay Freeport crossing the drainage channel at Rizal Avenue.

PROCTER & GAMBLE (P&G) PAPER CONVERSION BUILDING EXPANSION PROJECT, *Cabuyao, Laguna*

Detailed design of the building expansion (two phases) of Paper Conversion Facility, an existing one-storey enclosed structure that produces hygienic products. The first phase of the project covers the expansion of the existing Whisper Building, while the second phase involves the construction of a new warehouse designed to cater the increasing demand for storage space.

PROCTER & GAMBLE GRANULES PROJECT
Cabuyao, Laguna

Expansion of a 60 m. high dry laundry process (DLP) building and a 30 m. high packing area building. Both buildings are of structural steel super structure.

MONTE ALEGRE JUNCTION - MOLAVE ROAD

The project road is about 12.40 kms. in length by odometer measurement. From Monte Alegre Junction up to Barangay Switch, the length is about 8.00 kms. with an existing Portland Cement Pavement in good/fair to bad conditions. This stretch has only one (1) short span concrete bridge. Improvements required for this 8.00 kms. road section are stabilization of both left and right shoulders, improvement of road side ditches, repair and restoration of already damaged concrete pavement, provision of side slope protection in some portion, and probably channelization

design of two (2) junctions namely: Monte Alegre Junction and Barangay Switch Junction.

The length of about 4.40 kms. from barangay Switch to Molave is gravel road with two (2) concrete bridges presently under construction. Therefore, bridges and good concrete pavement within this road section of about 12.40 kms. may be considered as an exception to the cost of the project, to be confirmed during the detailed design stage.

Therefore, the total length of the project roads would be as follows:

1. Monte Alegre Junction - Aurora Road - 12.80 kms.
2. Monte Alegre Junction - Molave Road - 12.40 kms.

C-5/BONI SERRANO-KATIPUNAN AVE. INTERCHANGE

Modification of the approved design of the Katipunan Avenue intersection to provide a short cut and cover tunnel about 200 meters long, along the C-5 alignment and directly underneath the above -mentioned intersection.

WEDGE WOODS SUBDIVISION

Construction management of site development that includes PCCP roads, drainage structures, concrete water reservoir, RCDG bridges, multi purpose hall, underground telephone/cable lines, underground power lines and other works needed to complete site development project.

3610 C130 MAINTENANCE HANGAR
Gizan, Saudi Arabia

This facility for space necessary to do intermediate level maintenance and repair on C130 cargo aircraft. Functional requirements include the large open hanger space viable for 2 aircraft where each would have the use of a 5 ton under hang bridge crane. The major hangar/workshop space would be supported by electrical system and battery shops, etc.

1910 AIR CONTROL TOWER

This building provides Air Traffic Control Service to aircrafts using the main base runway. The major elements within the tower are emergency generator/battery space, mechanical electro-equipment space and crew lounge with control cab on top.

ISLAND PARK
Dasmariñas, Cavite

The project calls for the site development of 160 hectares property of Brittany Estates Corporation located in Dasmariñas, Cavite.

Phase I of the project involved 70 has. with a road network of 10 kms. The main entrance included fountains on both sides of the main road. A lagoon complements the round about at the main entrance.

March 1990 to May 1997

VARIOUS PROJECTS
Section Head, Structural Section/Project Manager

Involved in the administrative and technical supervision of engineers and draftspersons in the various projects that require structural engineering efforts.

Conduct engineering support services for ongoing construction projects when need arises.

As **Lead Structural Engineer** responsible for the overall structural design of the project.

As **Project Manager**, responsible for the overall technical management of the projects undertaken.

Coordinate and maintain harmonious relationships with clients and other disciplines involved with the project.

Conduct on-the-job training to counterpart staff on as-need basis on various government projects.

Supervision of engineers and draftspersons involved in various projects.

Projects Undertaken:

NINOY AQUINO INTERCHANGE
Airport Terminal, Pasay City

Project study to renovate and refurbish the existing NAIA Terminal 1 building to consolidate domestic and international flight operation of the Philippine Airlines.

EAST SIDE MANOR, *Pasig City*

The commercial center covers a floor area of 5,600 sq.m. with a roof deck and basement. The ground floor and second floor are occupied with retail shops and amusement area. Offices occupy the third floor. The roof deck serves as multi purpose area. The pump room and water reservoir occupy the basement. Parking area is provided for customers at the backside. Toilet facilities are provided in every floor.

GARAPAN HOTEL
Saipan

The hotel project is a 21-storey building with a 2nd floor mezzanine and 2 levels of penthouse. It is pyramidal in shape with a base footprint of 7,985 sq.m. The hotel parking and drivers' area is 4,134 sq.m. Open space is 16,682 sq.m.

PLAZA LUISITA SHOPPING MALL
San Miguel, Tarlac

The project consists of the detailed engineering design and construction supervision of all horizontal and vertical structures of a three-storey shopping mall.

OMRON FACTORY PROJECT
Subic Bay Olongapo City, Philipines

A one-storey, 6,000 sq.m., reinforced concrete building with 2-aisle 5-ton capacity cranes.

PHILIPPINE APPLIANCE CORP. (PHILACOR) ADMINISTRATION AND ENGINEERING BUILDING
Calamba, Laguna

Construction of two-storey, fully air-conditioned, reinforced concrete administration and engineering building.

NAIA INTERNATIONAL PASSENGER TERMINAL 3

Master Planning of the International Passenger Terminal 3 including 190,000 sq. m. passenger terminal building; and areas for 24 aircraft parking positions, apron taxiways, cross taxiways, multi-storey carparks, public bus stations, capable of handling annual passenger traffic of 10.3 M at the year. 2003.

KSS FACTORY PROJECT, *Naga, Cebu*

Construction of the KSS plant complex with an approximate total floor area including support facilities of 12,000 sq. m. on a 3.0 ha. lot.

BAYHOMES SUBDIVISION PROJECT
General Santos, Cotabato

Development of a 8-ha. land into a subdivision. Works include site development covering site grading and perimeter fence, road network and drainage systems, exterior water distribution and fire protection system including storage tank and pumping station sewerage system and central septic tank for townhouses units and exterior power and telephone systems.

STEEL CORPORATION OF THE PHILIPPINES COLD ROLLING AND COATING PLANT, *Balayan, Batangas*

The project calls for the construction of an integrated steel plant on a 20.0 ha lot and a marine terminal with truck parking on a separate 3 ha. lot .

The one storey structure is of structural steel framing with metal and cladding. Plant complex consist of the main plant to house the finished goods storage, administration building, site office/training center/canteen; and other auxiliary facilities.

PAL TERMINAL/NAIA III
Parañaque, Metro Manila

Structural and mechanical/electrical review; assessment of the connection with the domestic terminal relocation of the PAL flight kitchen and cargo facility; and the requirements at the arrival/departure areas. Surface traffic review and costings are also required.

MATSUSHITA ELECTRIC PHILS. CORP., STA. ROSA SECOND BUILDING PROJECT
Sta. Rosa, Laguna

Construction of an 88m x 120m long two-storey plant with a 10m wide x 12m long lean - to on one side. The plant will house the parts, home appliance and washing machine manufacturing operations. The lean-to will accommodate various support equipment, will serve as platform for second-floor production equipment and shed for incoming and outgoing trucks.

RURAL INFRASTRUCTURE FUND PROJECT
Nationwide

Preparation of new feasibility studies for 1,000 kms. of roads and bridges and 43 municipal feeder ports throughout the country. Detailed design and construction supervision for 500 kms. of roads and bridges and about 18 ports. Construction supervision for and additional 300 kms. of roads and bridges and 7 feeder ports.

MT. PINATUBO EMERGENCY PROJECT
Olongapo & Angeles

Construction of school buildings was among the immediate rehabilitation works of the government after the Mt. Pinatubo eruption in 1991. ESF school buildings plans were adapted and construction was undertaken in the 4 provinces affected as well as in Olongapo and Angeles. Each building is equipped with laboratory, a library, faculty room, 2 toilets and complete facilities for the classrooms.

LOCAL WATER UTILITIES ADMINISTRATION (LWUA) BICOL WATER DISTRICTS PROJECT
Region V

Preparation of water supply engineering feasibility studies and detailed design for the improvement of the water supply in 6 water districts in the Bicol Region.

NEW GENERAL SANTOS CITY AIPORT

The airport is intended to accommodate a projected traffic volume of about 200,000 passengers and 25,000 tons of cargo in the year 2005. The facility includes taxiways, aprons, access roads, vehicular parking area, a passenger terminal, cargo facilities, ancillary buildings, fueling systems, all supporting utilities lighting and navigational aids.

PRECISION ELECTRONIC CORP./MATSUSHITA COMMUNICATIONS, PHIL. (PEC/MCP) EXPANSION PROJECT
Laguna Techno Park, Sta. Rosa, Laguna

Semi-conductor plant complex on a 25-ha. lot, with the following works: (a) site development including perimeter lighting and fence with electrically operated gates, complete utilities and parking, truck yard and landscaping; (b) 2 units of 2-storey 7,200 sq.m. steel-framed buildings; (c) 840 sq.m. canteen building with clinic and 24-hour store; (d) 2,000 sq.m. energy center building to accommodate five 2.5 MW generators, six 50 HP air compressors and the control room; and (e) 100 cu.m. capacity elevated water tank.

SAN FERNANDO, LA UNION AIRPORT FESIBILITY STUDY

The San Fernando Airport Project is a component of Philippine Assistance Program Support Project and it involved the pre-feasibility level assessment of upgrading the airport to international standards.

CENTURY CANNING CORPORATION WASTEWATER FACILITIES, *Taguig, Metro Manila*

Construction and installation of the following treatment facilities/structures within the company's compound: lagoon extension, methane reactor, sepafloc, induced air floatation unit/sludge storage tank, final clarifier, sludge thickener and equalization basin. The work also includes piping networks and exterior lighting system.

PHIL. GEOTHERMAL, INC. (PGI) BULALO WAREHOUSE COMPLEX, *Laguna and Batangas*

The geothermal plant contains several Ormat Energy Converter (OEC) units for converting geothermal energy into electrical energy. The units are arranged in 3 separate locations-Bulalo 45 (main plant with 6 MW capacity), Bulalo 2 (6 MW) and Bulalo 51 (3.73 MW). The power plant consists of 6 OEC's (5 brine-heated dual type air-cooled and 1 brine-heated single type air-cooled). Each location will be equipped with complete fire fighting equipment and an auxiliary network with compressed air and motive fluid systems.

REPI ELECTRONICS (PHIL.), INC. FACTORY PROJECTS
Phase II, Carmona, Cavite

Complete engineering design for a 2-storey fully air-conditioned 12,000 sm semi-conductor plant complex on a 7.0 ha. lot. The work consists of total site development; support facilities such as a welfare building to accommodate the canteen and kitchen for 2,500 persons; a 100 cu.m. capacity elevated water tank; a material storage warehouse; and other amenities.

VARIOUS CLARK AIR BASE PROJECTS TO INCLUDE:

- AVIONICS INTERMEDIATE SHOP
- AEROMED EVACUATION AIRLIFT FACILITY
- ALTER AND MAINTAIN/REPAIR BUILDING 7707 A/B

TOYOTA MOTORS PLANT EXPANSION
Parañaque

The project refers to structural design services for the construction of the 24m x 24m. two-storey reinforced concrete extension building of the existing service training center.

PHILIPPINE NUTRITIONAL PLANT PROJECT
Canlubang, Laguna

Nutritional plant on a 10-ha lot with an administration building maintenance facilities, processing system, warehouse and other facilities. The plant has a total floor area of 2.1 has. Support facilities include wastewater and water treatment plant, airconditioning system, fire protection system and complete water utilities. A pipe network conveys solid and liquid waste of the nutritional plant to the treatment plant and the remaining liquid is chlorinated and then discharged into nearby streams.

TUPPERWARE MANUFACTURING PLANT
Canlubang, Laguna

Complete engineering and construction management for plastic products manufacturing plant complex on a 10.0 ha. lot. The work consisted of site development; a 2-storey production area and a 1-storey office and storage area with a total aggregate floor area of 26,000 sq.m. The complex was provided with complete HVAC, power, lighting, telephone and paging systems, compressed air lines and plumbing systems, a 100 cu.m. capacity water tank, an underground water tank for domestic use and other amenities.

HI-PRECISION STEEL CENTER, INC. PROJECT
Carmona, Cavite

Site development and consruction of the factory building for the manufacture of precision-cut steel sheets and two concrete administration buildings.

Oct. 1988 to March 1990

ESF INFRASTRUCTURE PROJECTS
Acting Manager, A & E Division, Technical Services Group

Review and evaluate designs of the project prepared by consultants to include roads, bridges, public markets, schools, hospitals, drainage and flood control.

Supervise draftsmen and engineers of various disciplines.

Coordinate with consultants.

Administer consultancy contracts.

Participate in the transfer of technology program for the projects.

Determine the need for training of counter part staff. Conduct on-the-job training.

Conduct field inspection of on-going projects.

July 1986 to Oct. 1988

MARGINAL WHARF FOR NATIONAL STEEL CORPORATION
Iligan City

DIAPHRAGM WALLS FOR BASEMENT OF CHINATOWN TWIN TOWERS, *Binondo, Manila*

PIER AND BREASTING DOLPHINS FOR PASAR SLAG OUTLOADING FACILITY
Isabel, Leyte

BORED PILE FOUNDATIONS AND PIERS FOR NAVOTAS CUT-OFF CHANNEL, NAVOTAS RIVER AND MALABON-BANGKULASI BRIDGES

DEL PAN BRIDGE BORED PILE FOUNDATIONS AND PIERS, *Port Area, Manila*

RECONSTRUCTION OF AGANA BRIDGE PIER NO. 6
Tarlac, Tarlac

RECONSTRUCTION OF CARMEN BRIDGE PIER NO. 12
Carmen, Pangasinan

RECONSTRUCTION OF CALVO BRIDGE OVER AGNO RIVER
Bayambang, Pangasinan

Civil-Structural Engineer

Geotechnical analyses, structural design of special foundations and field investigation of various infrastructure projects.

March 1985 to July 1986

ARIS (PHILS.), INC., BONDED WAREHOUSE
Pasig, Metro Manila

ARIS (PHILS.), INC., CANTEEN BUILDING
Pasig, Metro Manila

ARIS (PHILS) INC., 3 STOREY FACTORY EXPANSION BUILDING

DON MARIANO MARCOS HIGH SCHOOL (UNDER FROILAN HONG AND PARTNERS)
Diliman, Quezon City

Practicing Civil-Structural Engineer

MORONG POBLACION ROAD AND DRAINAGE IMPROVEMENT
Morong, Bataan

GSIS HEADQUARTERS BUILDING
Pasig City, Metro Manila

SAN MIGUEL CORPORATION HEADQUARTERS BUILDING
Pasay, Metro Manila

BENGUET CENTER OFFICE BUILDING
Pasig, Metro Manila

Senior Civil-Structural Engineer

Prepare design, analyses, estimates of roads, bridges, drainage, flood control systems and buildings structural elements.

Prepare technical aspects of feasibility studies.

Inspect on-going projects to assess progress of completion and extend assistance or clarification of technical design when the need arises.

Nov. 1979 to June 1980

PHILIPPINE REFUGEE PROCESSING CENTER
Morong, Bataan

PHILIPPINE PACKING CORPORATION PIER
Misamis Oriental

SHRINE OF STO. NIÑO
Tacloban, Leyte

PEOPLE'S CENTER
Tacloban, Leyte

UNIVERSITY OF LIFE
Pasig, Metro Manila

Structural Design Engineer

Design/analyses of building structural elements.

Quantity take-off of civil and structural items.

June 1982 to March 1985

NATIONAL BOOKSTORE SUPERBRANCH
Cubao, Quezon City

CENTRAL LUZON STATE UNIVERSITY
Cabanatuan, Nueva Ecija

ISABELA STATE UNIVERSITY
Echaque, Isabela

MIRDC METAL CASTING/TREATMENT PLANT
Taguig, Metro Manila
LRT 1 CENTRAL TERMINAL AND WELFARE BUILDINGS

LRT 1 CATENARY POLES AT DEPOT AREA

LRT 1 ON-LINE CATENARY POLES

MALACAÑANG PALACE AHU BUILDING AND POWERHOUSE

MALACAÑANG PALACE RENOVATION
KING'S COURT 1 OFFICE BUILDING
Makati, Metro Manila

Project Manager/Senior Structural Engineer

Design/analysis of building structural elements.

Supervision of all engineers and draftsmen involved in the project.

Preparation of computer analyses.

Coordination with the architects and other engineering disciplines.

Field inspection of on-going projects.

June 1980 to Jan. 1985

PORT OF CAGAYAN DE ORO
Cagayan de Oro City

PORT OF ZAMBOANGA
Zamboanga City

FEASIBILITY STUDIES AND DETAILED ENGINEERING DESIGN OF ECONOMIC SUPPORT FUND SECRETARIAT VARIOUS DRAINAGE AND FLOOD CONTROL PROJECTS IN OLONGAPO, ZAMBALES, BATAAN AND PAMPANGA

MABAYO BRIDGES NO. 1 AND 2
Morong, Bataan

Oct. 1978 to Nov. 1979

LA TONDEÑA, INC. FACTORY COMPLEX
Canlubang, Laguna
Field Engineer

Supervision of construction works.

Prepare quantity takeoff of civil and structural items.

Proposed Position	:	Environmental Specialist
Name	:	ANDRELITA JUAN – STO. DOMINGO
Date of Birth	:	1957
Nationality	:	Filipino
Education	:	Master of Science in Environmental Studies Miriam College Graduate School, completed all academic units, 1999
		Masters in Business Administration (MBA) Central Colleges of the Philippines, Quezon City, 1995
		Sector Technology and Management, Post Graduate Diploma, Netherlands International Institute for Management, Maastricht, The Netherlands, January 1991 – April 1991
		Bachelor of Science in Chemical Engineering, University of Sto. Tomas, España, Manila, 1979
Other Trainings	:	Pollution Prevention (P2) Cleaner Production (CP) Assessment Training Course, Cebu, February 14-18, 2000
		Environmental Management Systems (EMS) Implementation Course for Consultants, Traders Hotel, Manila, January 31, 2000
		Initial Environmental Review (IER) Training Course (P2 Component), Marco Polo Hotel, Davao City, October 25-29, 1999
		Initial Environmental Review (IER) Training Course (CP Component), Marco Polo Hotel, Davao City, November 8-12, 1999
		Environmental Management Systems/ISO 14001, Edsa Plaza Hotel, June 16, 1997
		Toxic and Hazardous Wastes Congress, PICC, Manila, January 28-29, 1997
		Orientation on DAO 96-37: Implementing Rules and Guidelines on Environmental Impact Statement System, The Sulo Hotel, Quezon City, January 13, 1997
		Integrated Compliance Monitoring Data Collection, Sampling and Sample Analysis, Pollution Management Appraisal Workshop, Legend Hotel, December 11-13, 1996

Training on User Fee (Laguna Lake) Legend Hotel, November 29, 1996

Data Assessment Workshop National Statistical Coordination Board Mount Sea Resort, Rosario, Cavite, May 14-15, 1996

Workshop on the Estimation of the Environmental Impacts of the Economic Activities and Asset Accounts of Other Resources, National Statistical Coordinator Board, Makati City, January 16, 1996

Environmental Impact Assessment with Remote Sensing and Geographical Information System, University of the Philippines, Diliman, Quezon City, August 1-4, 1995

Anaerobic Waste Treatment, University of the Philippines, Diliman, Quezon City, May 9, 1995

Workshop on Green Productivity, Development Academy of the Philippines, Tagaytay City, February 15-17, 1995

The First Philippine International Environmental and Pollution Management Technology Conference, PICC, Manila, January 13-20,. 1995

Industrial Waste Management, Manila Midtown Hotel, November 28, 1994

Resource Speaker – Training on Biogas Technology, Don Severino Agricultural College, 1996

Resource Speaker – Waste Management, CDO Meat Processing Company, 1994

Resource Speaker/Trainor – Animal By-Products Utilization / Waste Management Bureau of Animal Industry, 1984-1995

Various trainings, seminars and workshops

Waste Management and Quality Control, Madras-India, August – September, 1985

Languages : English - Fluent
Pilipino - Fluent

Countries of Work Experience : Philippines

Years with Firm : 5 years

Employment Record

From July 1995 : To March 2000
Employer : TCGI ENGINEERS
Position Held : **Environmental Specialist/Consultant**
Project Description/Duties :

Responsible for the conduct of Initial Environmental Examinations (IEE) for the proposed projects; prepares IEE Reports; recommend mitigating measures to minimize / control impact of the project to the environment; prepares Environmental Management Plan; coordinate with Department of Environment and Natural Resources (DENR) and LGU regarding necessary permits and clearances

Projects Undertaken:

CENTRAL VISAYAS AIPORTS
Bais City & Panglao, Bohol

The Bais City Airport is to be developed into an International Airport in two phases. The runway extends 2,500 m under Phase I and an additional 500 m. in Phase II. Operation of Airbus (A300) is expected by 2020. The new airport shall be equipped with all weather and 24-hour operation, shall be provided with passenger and cargo terminal buildings as well as air traffic control tower and air rescue and fire fighting station. Airport development layout shall involve 250 ha.

The Panglao Airport is also to be developed into an International Airport with 3,000 m. runway, equipped with an all weather and 24-hour operation, shall be provided with passenger and cargo terminal buildings, air traffic control tower and air rescue and fire fighting station. Operation of airbus (A300) is expected and the airport development layout shall involve 280 ha.

PEZA SPECIAL ECONOMIC ZONE
ENVIRONMENTAL MANAGEMENT PROJECT

The project includes the following:

a) Design and construction supervision of the new sewerage treatment facilities in Mactan EPZ (MEPZ) and Baguio EPZ (BCEPZ) and rehabilitation of the existing sewerage treatment facilities in Bataan EPZ (BEPZ)

b) Design and construction supervision of wastewater reuse facilities in Cavite EPZ (CEPZ), Mactan EPZ (MEPZ) and Baguio EPZ (BCEPZ).

c) EIA/ECC Consulting Services of the facilities specified in (a) and (b) above.

d) Environmental-related institutional strengthening of PEZA for the EPZ's (MEPZ, BEPZ, BCEPZ and CEPZ)

SUBIC BAY AREA MUNICIPAL DEVELOPMENT PROJECT (SBAMDP), *Olongapo and Zambales*

The project will improve urban infrastructure and enhance the institutional capacity of Subic, Castillejos, San Marcelino, Dinalupihan, Hermosa, Morong and Olongapo City and DILG. Urban infrastructures include 27 separate subprojects in the following five subsectors: (i) water supply; (ii) solid waste management; (iii) urban roads and bridges; (iv) flood control and drainage; and (v) market infrastructure improvement.

LIMA MONTE REAL PROJECT
Davao City

The Monte Real Project is to be developed into a high quality sustainable residential estate, which concerns for quality, comfort and well being of residents. It is located in Barangay Langub about 4 kms. from the center of Davao City.

PASIG RIVER ENVIRONMENTAL MANAGEMENT AND REHABILITATION PROJECT, *Metro Manila*

Preparation of a comprehensive phased and prioritized development plan for the environmental management and rehabilitation of the Pasig River systems with emphasis on the most severely populated parts of the river system within the urbanized area of Metro Manila, including the Pasig, San Juan and Marikina Rivers.

LIMA INDUSTRIAL ESTATE, *Lipa City, Batangas*

The project consists of horizontal and vertical structures with total area of 400 has. The project also includes structures as deepwell-drill work reservation tank, bridge/box culverts, road pavements, curbs and gutters, sidewalks, water supply system, complete with electrical and communication system.

From January 1999 : To July 1999
Employer : SCHEMA KONSULT, INC./NIPPON KOEI CO. LTD/DOTC

Position Held :
Project Description/Duties : **SOCIAL REFORM RELATED FEEDER PORTS DEVELOPMENT PROJECT (DOTC)**
Environmental Specialist

Responsible for the conduct of Initial Environmental Examinations (IEE) for the proposed feeder ports; prepares IEE Reports; recommend mitigating measures to minimize / control impact of the project to the environment; prepares Environmental Management Plan; coordinate with DOTC Project Management Office, Department of Environment and Natural Resources (DENR) and LGU regarding necessary permits and clearances.

From August 13, 1999 : To August 31, 1999
Employer : VICTORIO FARMS
Position Held :
Project Description/Duties : **VICTORIO QUAILS AND FEED MILL PROJECT**
Environmental Consultant

Performed Initial Environmental Examination for the project; coordinated with the Department of Environment and Natural

Resources for the processing of Environmental Compliance Certificate.

From January 1999 : To April 1999
Employer : RDR ENVIRONMENTAL & CONSULTING ENGINEERS
Position Held :
Project Description/Duties : **PHILIPPINE GEOTHERMAL INC. (PGI) PROJECT**
Environmental Specialist

Conducted Initial Environmental Examination for the upgrade of telecommunication systems of PGI, Bay, Laguna.

EASY CALL COMMUNICATIONS PHILIPPINES, INC. (ECPI) PROJECT

Conducted Initial Environmental Examination for Radio Base Station Projects of ECPI in two different locations: Tagaytay City and Bacoor, Cavite.

SMART COMMUNICATIONS INC. PROJECT

Performed Initial Environmental Examination for long lines relay tower projects of SMART to Guinobatan, Albay and Gumaca, Quezon.

LITTON AND COMPANY INC. PROJECT

Prepared an Initial Environmental Examination Report for the construction of Litton's Commercial Complex at Mandaluyong City; coordinated with the Department of Environment and Natural Resources, (DENR) regarding the Environmental Compliance Certificate of the project.

JANUS ENGINEERING INDUSTRIAL WAREHOUSE PROJECT

Janus Engineering is engaged in the manufacture of nameplates and emblems thru silk screening and vitro process for environmental compliance, an assistance was rendered to the company in the preparation of Initial Environmental Examination; acted as representative of the company during meeting of the DENR.

From July 1997 : To December 1998
Employer : SCHEMA KONSULT, INC.
Position Held :
Project Description/Duties :

ARAYAT MOUNTAIN ECO-TOUR RESORT AND COUNTRY CLUB PROJECT, Magalang, Pampanga
Senior Environmental Engineer

Conducted Environmental Impact Assessment of the project.

PNCC SILANGAN COMPLEX PROJECT
Calamba, Laguna

Prepared Initial Environmental Examination of the project.

ILIGAN SANITARY LANDFILL PROJECT
Iligan, City

Involved in the preparation of Environmental Impact Statement for the project.

REGAL BAY RECLAMATION PROJECT
Ternate, Cavite

Assisted in the conduct of Environmental Impact Assessment of the project (EIA).

SILAY AIRPORT PROJECT
Bacolod City

Assisted in the preparation of Environmental Impact Statement of the project.

PILIPINAS MAKRO STORE PROJECTS
Cainta/Sucat/Novaliches

Responsible in the conduct of Initial Environmental Examination of the projects.

ASIAN HOSPITAL INC./INCINERATION PLANT PROJECTS
Fort Bonifacio, Makati City

Performed Initial Environmental Examination of the projects.

CONSTRUCTION OF TECHNICAL AND DISTRIBUTION CENTER - 3M PHILIPPINES INC.
Sucat, Parañaque City

Conducted Initial Environmental Examination of the project.

EDMARK OFFICE BUILDING PROJECT
P. Tuazon, Cubao, Quezon City

Conducted Initial Environmental Examination of the project.

From July 1997 : To Feb. 1998
Employer : CENTER FOR ADVANCED PHILIPPINE STUDIES
Position Held :
Project Description/Duties : GREENPEACE INTERNATIONAL PROJECT
Environmental Consultant

Conducted a Study for Greenpeace International for Importation of Polyvinyl Chloride (PVC) Wastes from Netherlands; prepared write-up.

From April 1996 : To June 1997
Employer : PRC-ENVIRONMENTAL MANAGEMENT INC.
Position Held :
Project Description/Duties : INDUSTRIAL ENVIRONMENT MANAGEMENT PROJECT
Senior Research Assistant

Conducted Pollution Management Appraisal for various companies e.g. Colgate Palmolive Philippines, Nenita Farms, INFARMCO, Lu Do & Luym; Rizal Cement Plant; John and Jhon Farms; Franklin & Baker Oil Company, Cocochem, Peter & Paul Oil Company; General Milling Corporation, etc. performed survey and assessments conducted financial and technical review organized training and seminars; conducted feasibility studies; monitored reduction of impacts based on the mitigating measures employed; acted as resource person.

INVIRONMENTAL INFRASTRUCTURE SUPPORT CREDIT PROGRAM
Environmental Management Specialist

Assessed various power plants; conducted financial and technical analysis; determine needs particularly the conduct of Environmental Impact Assessment for power sector; prepared case studies.

ENVIRONMENTAL USER FEE SYSTEM

Involved in the preparation of Implementing Guidelines for User Fee System.

From Nov. 1995 : To March 1996
Employer : PRC-ENVIRONMENTAL MANAGEMENT INC./DENR & UNITED STATES AGENCY FOR INTERNATIONAL AID (USAID)

Position Held :
Project Description/Duties : INDUSTRIAL ENVIRONMENTAL MANAGEMENT PROJECT
Environmental Consultant

Performed technical review and financial analyses needed for the Pollution Management Appraisal of various companies.

From May 1983 : To Oct. 1995
Employer : BAI-DEPARTMENT OF AGRICULTURE
Position Held : Pollution Control Officer/Researcher
Project Description/Duties :

Supervised the operation of Rendering Plant and Wastewater Treatment Facility acted as coordinator to DENR re: compliance and pollution control; acted as Resource Person on Waste Management for slaughterhouses and meat processing plants; assisted the agency in administrative works and implementation of various research projects; prepared training design, technical reports and feasibility studies.

ESTABLISHMENT OF ANIMAL PRODUCTS DEVELOPMENT CENTER, UNDP-FAO
Trainor
Acted as resource person in several trainings conducted by the center; involved in strategic planning of the project.

From July 1991 : To May 1983
Employer : OFFICE OF THE GOVERNOR
Position Held : Officer-in-charge/Monitoring and Research Section
Project Description/Duties :

Managed the monitoring activities for various infrastructure projects; coordinated with various government agencies regarding the status of on-going projects e.g. roads, school

buildings and bridges.

From Nov. 1979	:	To Aug. 1980
Employer	:	GRAPHIC INK CORPORATION
Position Held	:	Chemical Engineer
Project Description/Duties	:	

Prepared ink and varnish formulations; performed quality assurance on ink products.

Proposed Position	**Hydrologist**
Name	**CHOLLY F. FERROLINO**
Date of Birth	1954
Nationality	Filipino
Education	B.S. Civil Engineering National University, 1978
Professional Registration	Registered Civil Engineer 1979, No. 23329
Professional Training	Leadership Training, Ateneo de Manila, 1978
	Marketing Strategy, UP, Diliman, Q.C., 1978
	PERT/CPM and Network, PICE, UP, Diliman, Q.C., April 2-15, 1979
	Countryside Development Planning, 1980
	Public Health Infrastructures, March 5-9, 1981 Office of Special Projects, MWSS
	Construction Management for Supervisors, Erectors, Inc., September 9-15, 1986
	Accounting for Non-Accountants conducted by Erectors, Inc., March 3-12, 1987
	Solid Waste Management, Sept. 16-17, 1996, Iloilo City

Employment Record

January 1990 to Present	TCGI ENGINEERS **Deputy Project Manager/ Team Leader/Resident Engineer**
Nov. 1987 to Dec. 1989	ERINCOR DEVELOPMENT CORP. **Manager (Engineering and Control)**
June 1984 to Nov. 1987	ERECTORS INCORPORATED **Manager (Engineering and Control)**
May 1983 to May 1984	ERECTORS INCORPORATED Baghdad, Iraq **Project In-Charge**
Nov.1982 to March 1983	ERECTORS INTERNATIONAL Northern Iraq **Manager (Engineering and Control)**
March 1982 to Nov. 1982	ERECTORS INCORPORATED **Supervisor**

MONTE REAL PROJECT
Sr. Sanitary/Water Supply Engineer

The Monte Real Project is to be developed into a high quality sustainable residential estate, which concerns for quality, comfort and well being of residents. It is located in Barangay Langub about 4 kms. from the center of Davao City.

Responsible for the preparation of revised design and drawings for water supply and sewerage system.

From Jan. 1995 : To Sept. 1998
Employer : BAHARUDDIN & ASSOCIATES
Consulting Engineers
Negara Brunei Darussalam

Position Held and
Description of Duties :

BRUNEI SHELL PETROLEUM (BSP) PROJECTS
Project Manager/In Charge of Sanitary Section/Sr. Civil-Sanitary Engineer

Responsible for over-all coordination, liaison with BSP Engineers and design engineers, design of water and sanitary supply, quality check of all produced drawings and documents to verify compliance to ISO 9001 requirement and correctness of the following:

- Upgrade Muara Jetty – *Muara, Brunei Darussalam*
- Upgrade Water Supply System of Muara Depot, *Brunei Darussalam*
- Upgrade BSP Headquarters Parking Area, *Panaga*
- Panaga Hospital Refurbishment
- Seria Sewerage, Phase IV, *Panaga*
- Panaga Round-about Project
- CPTQ-7 Refurbishment

Jan. 1995 to Dec. 1976
VARIOUS PROJECTS
Project Manager/In-Charge of Sanitary Section/Sr. Civil-Sanitary Engineer

Responsible for preparation of conceptual design and detailed drawing and coordination with government agencies concerned and architects. Also responsible as Project Manager incharge of construction of the following projects:

- Pantai Menteri Golf Course Sanitary works, *Bandar Seri Begawan, Brunei Darussalam*
- Scout Headquarters Building, *Bandar Seri Begawan, Brunei Darussalam*
- Beribi Phase 2 Sewerage Project, *Bandar Seri Begawan, Brunei Darussalam*
- Various Multi-Storey Housing Units, *Bandar Seri Begawan, Kuala Belait and Tutung Districts*

From Jan. 1990 : To Dec. 1994
Employer : TRANS-ASIA PHILIPPINES
Position Held and
Description of Duties :

VARIOUS PROJECTS
Project Manager/Sr. Civil-Sanitary Engineer

Responsible for over-all coordination and management, design of water supply, sewerage and plumbing system of various projects including preparation of detailed drawings, cost estimates and technical specification of various projects.
Also, involvement in the preparation of drawings, technical reports and costs of various Master Plan reports.

The projects are:

- Pamalican Beach Resort Project, Phase I, *Amanpulo, Palawan*
- Master Plan for Cagayan de Oro-Iligan Corridor, *Cagayan de Oro*
- Makar Wharf Master Plan, *Gen. Santos City*
- Monte de Piedad Tower, *Cebu City*
- 6750 Tower, *Ayala Avenue, Makati City*
- Far East Bank Tower, *Buendia Avenue, Makati City*
- Far East Bank Bldg., *Cebu City*
- Pamalican Beach Resort Project, Phase II, *Amanpulo, Palawan*
- Elephant Palace-Golf Course Water Supply and Drainage System Study, *Jakarta, Indonesia*
- Dar-Al-Riyadh Hospital, *K.S.A.*
- Refurbishment of AFP Sewage Treatment Plant, *Camp Aguinaldo, Quezon City*

Various other projects involving multi-storey buildings and site development

From Dec. 1988 : To Dec., 1989
Employer : ZUHAIR FAYEG CONSULTANTS
Jeddah, K.S.A.

Position Held and
Description of Duties :

VARIOUS PROJECTS
Sr. Sanitary Engineer

Responsible for preparation of detailed drawings and documents for sanitary works of the following projects:

- Prince Turki Palace, *Jeddah, K.S.A.*
- King Khalid International Airport

From July 1986 : To Nov. 1988
Employer : DCCD ENGINEERING CORP.
Position Held and
Description of Duties :

VARIOUS PROJECTS
Sr. Civil/Sanitary Engineer

Various OICC and government and private sectors for sanitary works. The projects are:

- Upgrade 106 housing units, Clark Air Base

From April 1975 : To July 1976

Employer : NATIONAL IRRIGATION ADMINISTRATION
UPPER PAMPANGA RIVER PROJECT

Position Held and
Description of Duties : **UPPER PAMPANGA RIVER PROJECT**
Inspector – Pipings

Government inspector in the construction of Pantabangan Power Plant located in Pantabangan, Nueva Ecija.

II. **Certification** :

I, the undersigned, certify to the best of my knowledge and belief, that the information in this biodata are true and correctly describes myself, my qualifications and my experiences. I understand that any willfull misstatement described herein may lead to my disqualification or dismissal, if employed or renders me liable for criminal prosecution.

Moreover, I certify that I am a full time / part time employee of TCGI Engineers and I have been employed by the firm for the last 1 year.

SIGNATURE :

DATE OF SIGNING : / /
Day Month Year

- Pacific Plaza Tower, Ayala Avenue, Makati
- One Salcedo Place, Ayala Avenue, Makati
- Various other projects

From July 1985 : To June 1986
Employer : SAUDI MEDICAL CHARTERED LTD., ADHUM HOSPITAL, *Jeddah, K.S.A.*

Position Held and
Description of Duties :

VARIOUS PROJECTS
Sr. Civil/Sanitary Engineer

Acted as government representative in monitoring the maintenance contractor's performance in maintaining the hospital various equipment and amenities such as reverse osmosis treatment plant, sewage treatment plant, swimming pool, housing/hospital piping systems and irrigation system.

From Jan. 1981 : To June 1985
Employer : DCCD ENGINEERING CORP.
Position Held and
Description of Duties :

VARIOUS PROJECTS
Sr. Civil/Sanitary Engineer

Responsible for the concept design and detailed design of Southern Bay Outfall Project and Southern Metro-Manila Sewerage Project of Metropolitan Water and Sewerage System.

From Sept. 1978 : To Dec. 1980
Employer : CDCP
Position Held and
Description of Duties :

VARIOUS PROJECTS
Engineer III

Responsible for the detailed design for water/sewerage system of the following project:

- First Neighborhood Unit, Roxas Boulevard, Manila
- Financial Center Area, Roxas Boulevard, Manila
- Maricalum Industrial Estate, Negros

Various other projects involving multi-storey buildings and site development

From Aug. 1977 : To Aug. 1978
Employer : NATIONAL POLLUTION CONTROL COMMISSION
Position Held and
Description of Duties :

Pollution Control Technologist II

Government representative in monitoring and enforcement of Pollution Control Law of residential and industrial plants by actual inspection, testing of water samples and evaluation of existing wastewater sewerage treatment plants.

Proposed Position	**Cost Engineer**
Name	**CYNTHIA B. NARIO**
Date of Birth	4 October 1956
Nationality	Filipino
Higher Education	B.S. in Civil Engineering Manuel L. Quezon University 1979
Professional Registration	Registered Civil Engineer, No. 22857, May 1980
Other Training	Basic Electronic Data Processing Ateneo Computer Technology Center, May to June, 1986
Membership to Professional Societies	Regular Member of Philippine Institute of Civil Engineers,PICE
Languages	English - Fluent Filipino - Fluent

Employment Record

Jan. 1990 to Present	TCGI ENGINEERS **Section Head – ASTE Cost Engineer Section** Involve in cost engineering and quantity take-off of various civil works project in public and private infrastructures and site developments. Prepare quantity take-off, cost estimates, bid schedules, detailed unit cost analysis and Approved Agency Estimate.
Nov. 1989 to Dec. 1989	ECONOMIC SUPPORT FUND SECRETARIAT (ESFS) **Cost Engineer** Prepare quantity take-off, cost estimates, bid schedules, detailed unit cost analysis and Approved Agency Estimate. Facilitate related jobs as requested by the senior cost engineer.
June 1989 to Nov. 1989	TAMS CONSULTANT INC. IN ASSOCIATION WITH ENGINEERING DEVELOPMENT CORPORATION OF THE PHILIPPINES **Cost Engineer** Involve in cost engineering and quantity take-offs of various civil works for ESF Projects.

Jan. 1986 to June 1989

SELF EMPLOYED
Civil Engineer

Prepare estimates and specification for various project e.g. residential houses, warehouses, etc.

Oct. 1985 to Jan. 1986

ARMORPLY CONCRETE FORMING SYSTEMS INC.
Cost Engineer

Conduct quantity take-off and cost estimates of formworks and scaffoldings.

Aug. 1985 to Sept.1985

ENGINEERING & DEV. CORPORATION OF THE PHILIPPINES (EDCOP)
Assistant Civil Engineer (Estimator)

Assist in developing unit prices, quantity and cost estimates and specifications for roads, bridges, dams, ports and terminal projects.

Feb. 1980 to Aug. 1985

ENGINEERING AND DEVELOPMENT CORPORATION OF THE PHILIPPINES (EDCOP)
Jr. Civil Engineer (Cost Estimator)

Conduct quantity take-off. Assist in cost estimating and preparation of specifications for roads, water impounding, wharf complex, reclamation and other infrastructure projects.

Project Experience

1995 to Present

VARIOUS SITE DEVELOPMENT UNDERTAKEN
Sr. Cost Engineer – Section Head

CENTRAL VISAYAS AIRPORTS, *Bais City and Panglao, Bohol*

The Bais City Airport is to be developed into an International Airport in two phases. The runway extends 2,500 m under Phase I and an additional 500 m. in Phase II. Operation of Airbus (A300) is expected by 2020. The new airport shall be equipped with all weather and 24-hour operation, shall be provided with passenger and cargo terminal buildings as well as air traffic control tower and air rescue and fire fighting station. Airport development layout shall involve 250 ha.

The Panglao Airport is also to be developed into an International Airport with 3,000 m. runway, equipped with an all weather and 24-hour operation, shall be provided with passenger and cargo terminal buildings, air traffic control tower and air rescue and fire fighting station. Operation of airbus (A300) is expected and the airport development layout shall involve 280 ha.

VISTA DE BAY PROJECT, PHASE I
Calamba, Laguna

The project refers to a 150 – ha. Property to be developed into a high and medium-high residential subdivision. It consists of two hills master planned such that future homeowners will have vantage view of Laguna de Bay, Mount Makiling and the Metro Manila area.

The project owners envisioned the Subdivision to be environment-friendly, that is, road design and site grading conform closely with the existing topography. Some areas are allocated as view corridors, to be planted with trees and shrubs. The water reservoir will be built on-grade, with the hill's summit. Cables for utilities will be laid underground – for power, telephone and CATV. A spine road connecting the two hills will provide access to the site.

LIMA INDUSTRIAL ESTATE
Lipa City, Batangas

The project consists of horizontal and vertical structures with total area of 400 has. The project also includes structures such as deepwell-drill work reservation tank, bridge/box culverts, road pavements, curbs and gutters, sidewalks, water supply system, electrical and communication system. Transportation terminals, gates and security fence are also included. TCGI provided detailed Engineering design and construction management including geotechnical investigation & EIA Study.

MT. VIEW INDUSTRIAL PARK
Carmona, Cavite

Industrial park with a total area of 100 has. which blends desired land use with sound engineering design with regards to civil, structural, geotechnical, water supply and sanitary, electrical and communication system requirements. TCGI provided master planning for integrated land use and subdivision layout; conceptualization and design blending client's visions with workable plans.

BIÑAN RESIDENTIAL SUBDIVISION
Biñan, Laguna

The project refers to the development of 27-hectares property in Biñan, Laguna near the Laguna Technopark.

The property is to be developed into a residential community with about 1,000 high middle-income class house units. Site development works include about 900m of road including crub and gutter, drainage, exterior lighting and perimeter fencing.

Amenities include tennis courts, swimming pool and clubhouse.

DAIICHI INDUSTRIAL PARK-ECOZONE
Silang, Cavite

The project is a 6-has Industrial Park located along Maguyam Road in Silang, Cavite approximately 36 kilometers from Makati City. The project area is one of the fastest growing centers in Cavite province. Works for the project include:

1. Earthworks for industrial lots
2. Roads and pavements
3. Water distribution system
4. Construction of grand entrances
5. Erection of CHB fence with cyclone wire
6. Construction of one steel bridge
7. Sewage Treatment Plant construction
8. Drainage systems

ACACIA PARKHOMES
Batangas

Site development of an area of about 10 has., construction of multi-purpose hall with a floor area of 500 sq.m., construction of row houses, construction of deep well, elevated water tank, guard house, entrance gate, and perimeter fence, ensure that the contract documents, approved plans and project specifications are strictly followed.

1992 to Present

VARIOUS PROJECTS OF TCGI ENGINEERS
Sr. Cost Engineer/Head, Architectural, Structural and Sanitary Cost Engineering Section

Responsible for the overall management of the conduct of cost estimating for various projects of TCGI.

Projects Undertaken:

GMA NETWORK CENTER PROJECT
Quezon City

The project is Phase I of GMA Network Center which involves construction of a new building and site development of the area located at the corner of EDSA and Timog Avenue.

The proposed building consists of two basement parking levels, ten floor levels and a roofdeck with helipad. The two basement levels will accommodate about 72 parking slots per floor while the first three floors will house the various TV stations.

PTC BUILDING PROJECT
Bagtikan St. Makati City

The proposed structure comprised four (4) basement floors and seven (7) floor above grade. Basement 1 and 2 are Training centers while Basement 3 and 4 are for parking services. The seven (7) levels above grade are intended for office use. The project's main

goal and objective is to contribute economic progress to its community and to house a training facility for the promotion of manpower skills in the shipping industry.

The project covers a total floor area of 14,287.48 sq.m.

AVON MANUFACTURING PLANT PROJECT
Clamba, Laguna

The project is a manufacturing plant on a 7-ha lot consisting of a 7,800 sq.m. manufacturing building, 2,800 sq.m. 2-storey office building, 9,600 sq.m. warehouse facility, complete with support utilities such as steam generator, compressed air, raw and processed water (DI and Chilled), waste treatment, etc. Amenities for the project include basketball and tennis courts and a covered area for indoor games.

CROWN RESIDENTIAL SUBDIVISION
Biñan, Laguna

Site development of 27 hectares property in Biñan and construction of 9 model houses and 1000 units of high middle income class houses.

EASTSIDE MANOR SHOPPING CENTER
Pasig City

The commercial center covers a floor area of 5,600 sq.m. with a roof deck and basement. The ground floor and second floor are occupied with retail shops and amusement area. Offices occupy the third floor. The roof deck serves as multi purpose area. The pump room and water reservoir occupy the basement. Parking area is provided for customers at the backside. Toilet facilities are provided in every floor.

APO CEMENT BAG/BULK LOADING FACILITIES
Cebu & Batangas

The project involves the following facilities:

1. Bulk loading platform
2. Breasting dolphins
3. Mooring dolphins
4. Conveyor trestle
5. Cement silo

The clinker and raw mill silo at Apo Cement Plant in Cebu is also included.

MOOG PLANT PROJECT
Baguio City

Expansion of a single-storey building, floor area of 1,000 sq.m. located in a 1.2 ha. plant site. The building is expandable to 5,000

sq.m. Also includes supporting facilities like plant site roads, parking, drainage power, water and landscaping.

READ RITE MANUFACTURING PLANT
Canlubang, Laguna

The project is an expansion of an existing 2-storey plant class 100 (also developed by TCGI) of Read-Rite in Carmelray at the Canlubang Industrial Estate. The 3-storey class 10,000 clean room facility building has a footprint of 4,500 sq.m. with complete amenities such as back-up power, compressed air, raw and processed water, waste treatment, etc.

BULACAN BULK WATER SUPPLY (LWUA WATER SUPPLY SYSTEM)
Bulacan

The project is aimed at augmenting the water supply for the municipalities of Meycauayan, Guiguinto and Obando.

The project features the development of new sources with the construction of 12 tube wells along the Angat River.

PROCTER & GAMBLE (P&G)'S PAPER CONVERSION BUILDING EXPANSION PROJECT (PHASE I & II)
Cabuyao, Laguna

Detailed design of the building expansion (two -hases) of Paper Conversion Facility, an existing one-storey enclosed structure that produces hygienic products. The first phase of the project covers the expansion of the existing Whisper Building, while the second phase involves the construction of a new warehouse designed to cater the increasing demand for storage phase.

NAIA IN -FLIGHT KITCHEN
Pasay City

The In-Flight Center building of Philippine Airlines located within the NAIA Complex has been in operation for about 20 years.

The three-storey structure is being used primarily as kitchen to prepare food for domestic and international flights of PAL and other international airline companies; as storage area for all foodstuffs such as vegetables, fruits, dairy products, meats, cold cuts, rice and flour; warehouse for dry goods, such as food packaging materials; office for administrative functions; employees' canteen; and lounge area for cabin crew.

The whole second floor of the building is being used as kitchen and cold storage. The previously envisioned capacity of 9,000 meals per day has already reached 18,000 meals per day due to more frequent flights bound for Manila.

Involve in the preparation of Approved Agency Estimate (AAE) & bid schedule.

Evaluate cost estimates submitted by consultants.

June 1989 to Nov 1989

ESF IN HOUSE CONSULTANCY PROJECTS
TAMS CONSULTANT IN ASSOCIATION WITH ENGINEERING AND DEVELOPMENT CORPORATION OF THE PHILIPPINES
Cost Estimator

Involve in the preparation of quantity take-off cost estimates, Approved Agency Estimate (AAE), detailed unit cost analysis, bid schedules and plans and specifications.

Assist in the evaluation of contractors bid.

Assist in the review of consultant estimates.

Facilitate related jobs as requested by the Senior Cost Estimator.

Jan. 1986 to June 1989

RESIDENTIAL HOUSES & WAREHOUSE PROJECTS
Civil Engineer

Prepare estimates and specification for various projects.

Oct. 1985 to Jan. 1986

ARMORPLY CONCRETE FORMING SYSTEMS INC. PROJECTS
Cost Engineer

Conduct quantity take-off and cost estimates of formworks and scaffoldings for various projects.

Aug. 1984 to Sept. 1985

ADB THIRD ROAD IMPROVEMENT PACKAGES7A, 7B AND 7C, MINDANAO
Assistant Civil Engineer - Cost Estimator

Prepare quantity estimates. Assist in the preparation of project estimates, equipment owning, operating cost and detailed unit cost analysis.

Assist in the evaluation of bids submitted.

1984

HIBULANGAN SWIM PROJECT
Asst. Civil Engineer - Cost Estimator

Prepare quantity estimates. Assist in the preparation of project estimates, contract documents and technical specifications.

1983 to 1984

SAN ROQUE MULTI-PURPOSE PROJECT
Asst. Civil Engineer - Cost Estimator

Prepare quantity estimates. Assist in the preparation of project estimates, contract documents and technical specifications.

1982 to 1983

DUCT BERTHING FACILITIES
Asst. Civil Engineer - Cost Estimator

Prepare quantity estimates. Assist in the preparation of project estimates, contract documents and technical specifications.

1982

BATANGAS COAL BLENDING
Asst. Civil Engineer - Cost Estimator

Prepare quantity estimates. Assist in the preparation of project estimates, contract documents and technical specifications.

Aug. 1981 to 1982

RURAL WATER WORKS DEVT. CORPORATION WAREHOUSE OFFICE AND ACCESS ROAD
Asst. Civil Engineer - Cost Estimator

Prepare quantity estimates. Assist in the preparation of project estimates, contract documents and technical specifications.

June to Aug. 1981

SAN ROQUE MULTI-PURPOSE PROJECTS TEMPORARY FACILITIES
Jr. Civil Engineer and Cost Estimator

Prepare quantity estimates and assist in cost engineering works.

Assist in the preparation of program of works, plans and specification of the project.

Involve in the evaluation and checking of progress billings, variation order time extensions and price escalation.
Assist in the construction supervision, coordination, control monitoring and scheduling of works.

April to May 1981

PASAR MARGINAL WHARF COMPLEX, PHILIPPINE ASSOCIATED SMELTING AND REFINING CORPORATION
Jr. Civil Engineer and Cost Estimator

Prepare quantity estimates and assist in cost engineering works.

Assist in the preparation of program of works, plans and specification of the project.

Involve in the evaluation and checking of progress billings, variation order time extensions and price escalation.

Assist in the construction supervision, coordination, control monitoring and scheduling of works.

Feb. to March 1981

VITARICH CORPORATION WAREHOUSE

Jr. Civil Engineer and Cost Estimator

Prepare quantity estimates and assist in cost engineering works.

Assist in the preparation of program of works, plans and specification of the project.

Involve in the evaluation and checking of progress billings, variation order time extensions and price escalation.

Assist in the construction supervision, coordination, control monitoring and scheduling of works.

Nov. 1980 to Jan. 1981

MINI HYDRO PROJECTS
Jr. Civil Engineer and Cost Estimator

Prepare quantity estimates and assist in cost engineering works.

Assist in the preparation of program of works, plans and specification of the project.

Involve in the evaluation and checking of progress billings, variation order time extensions and price escalation.

Assist in the construction supervision, coordination, control monitoring and scheduling of works.

Aug. to Oct. 1980

BANCOM REALTY CORPORATION CEBU RECLAMATION PROJECT
Jr. Civil Engineer and Cost Estimator

Prepare quantity estimates and assist in cost engineering works.

Assist in the preparation of program of works, plans and specification of the project.

Involve in the evaluation and checking of progress billings, variation order time extensions and price escalation.

Assist in the construction supervision, coordination, control monitoring and scheduling of works.

April to July 1980

PORO POINT TERMINAL
Jr. Civil Engineer and Cost Estimator

Prepare quantity estimates and assist in cost engineering works.

Assist in the preparation of program of works, plans and specification of the project.

Involve in the evaluation and checking of progress billings, variation order time extensions and price escalation.

Assist in the construction supervision, coordination, control monitoring and scheduling of works.

April 1980

COAL TRANSPORT & DISTRIBUTION TERMINAL
Jr. Civil Engineer and Cost Estimator

Prepare quantity estimates and assist in cost engineering works.

Assist in the preparation of program of works, plans and specification of the project.

Involve in the evaluation and checking of progress billings, variation order time extensions and price escalation.

Assist in the construction supervision, coordination, control monitoring and scheduling of works.

March to April 1980

FOURTH IBRD HIGHWAY PROJECT
Junior Estimator

Assist in the revision of unit cost analysis.

Feb. 1980

PNOC COAL LOGISTICS INFRASTRUCTURE PROJECT
Junior Civil Engineer

Conduct wind data analysis.

Proposed Position	:	**Geodetic Engineer**
Name	:	**RICARDO B. PINOY**
Date of Birth	:	January 18, 1931
Nationality	:	Filipino
Education	:	B.S. in Mineral Industries and Geodetic Engineering University of the Philippines, 1954
Professional Training	:	Concrete Quality Control Seminar, David Cooney - Speaker, Makati City, February 9, 1996 Training Course for the Conduct of FS for Rural Roads, March 09, 11, 16, 18, 1993 Seminar Cum Workshop on Asphaltic Concrete Mix Design, Mr. David G. Wallace - Speaker, Manila Pavilion (Manila Hilton), Malate, Aug. 4, 1992 Seminar on Concrete Treated Base (CTB) and Slurry Sealing, Mr. Warman Braun - Speaker, Jeddah, Saudi Arabia, Oct. 1982 Seminar on Tunnelling, Open Pit and Underground Mining, Underground Blasting and Underground Mine Surveying, Mr. William Stalley - Speaker, Diliman, Quezon City, 1952 Seminar on Mineral Deposits of the Philippines, Geological Mapping and Mine Procedures, Mr. Guzon, Director - Bureau of Mines, Intramuros, Manila, 1952
Languages	:	English - Fluent Filipino - Fluent
Countries of Work Experience:		Philippines
Years with Firm	:	10 years
Employment Record		
From Feb. 1990	:	To Present
Employer	:	TCGI ENGINEERS
Position Held	:	
Project Description/Duties	:	**MWSI PUMP STATIONS**, *Quezon City* May 1999 to Feb. 2000 **Sr. Survey/Geodetic Engineer** The project involves the construction of two new pump stations and upgrade of an existing pump station. They are the La Mesa North and Pump Station Upgrade,

Commonwealth Pump Station and Sacred Heart Pump Station.

Conduct topographic surveys on the pump stations.

FERNANDO AIR BASE, *Lipa, Batangas*
Dec. 1998 to April 1999
Geodetic Engineer

Master planning and preparation of conceptual designs for existing military airbase which will be converted to General Civil Aviation and Cargo for BOT proposal.

Conduct field investigation and the necessary initial topographic and boundary survey for the proposed air base.

FUGA INTERNATIONAL RESORT INTERNATIONAL AIRPORT, *Cagayan*
March 1998 to May 1998
Geodetic Engineer

Masterplanning of the airport which is identified to have the following facilities:

Airside facilities:

- Runway : 2,500 m. x 60 m. x 18 inches
- Runway Visual Aids and Navaids: Category I lighting system with complete Category I precision apron system
- Telecommunications : For control tower and other aviation facilities. Radar is an option.
- Apron : Area = 45,000 sq.m.

Landside Facilities

- Passenger terminal : capacity = 5,000 passenger daily and capable to handle B-747 traffic
- Approach road and vehicle parking : 14,000 sq.m. for access road and 6,000 sq.m. for parking
- Airfield/Airport Maintenance Building : 400 sq.m. with 100 sq.m. office space, and 300 sq. m. asphalt parking area
- Control Tower : four storeys high
- Crash Fire Rescue Building (CFR): 500 sq.m. fire station
- Cargo Building : 1200 sq.m. fire fabricated metal hangar
- General Utilities : power generation, mechanical, plumbing and drainage, sewage treatment plant.

Conduct field investigation and the necessary initial topographic and boundary survey for the proposed airport.

JULIA VARGAS FLYOVER
May 1996 to March 1998
Sr. Geodetic/Locating/Survey Engineer

This project is a 774.0 meter, 26 span, four lane divided flyover and includes other related structures and amenities.

Project cost is approximately ₱400 million.

Responsible for the horizontal and vertical control points from structure to superstructure. Check alignment and vertical elevations of structure for coating and pouring of concrete.

Supervision of the construction of the flyover and checked on the following:

- Bored pile location and elevation.
- Roadway centerline, right-of-way, subgrade base course and PCCP elevation prior to overlay of each item.
- Manhole and drainage locations.
- Retaining wall from footing to top of construction joint.

NAIA – IPT3, *Pasay City*
April 1996 to May 1996
Geodetic Engineer

Master Planning of the International Passenger Terminal 3 including 190,000 sq.m. passenger terminal building; and areas for 24 aircraft parking, apron, taxiways, cross taxiways, multi-storey parks, public bus stations, etc., capable of handling annual passenger traffic to 10.3 M at the year 2003.

Serve as consultant in checking the survey controls of the project.

Check the survey returns and make recommendations on methods of checking the results in the field.

Conduct field investigation and check whether computer-based data inputs and analysis is consistent.

Conduct accuracy assessment and classification techniques relative to the requirements of the project.

FEASIBILITY STUDY OF THE RAILWAY CONNECTION BETWEEN CLARK AIRFIELD IN PAMPANGA AND FORT BONIFACIO IN METRO MANILA
Nov. 1995 to April 1996
Sr. Locating Engineer

Undertake data gathering, field survey and reconnaissance works in selecting route alternatives.

CLARK INTERNATIONAL AIRPORT
July 1995 to Oct. 1995
Geodetic Engineer

The project involves the Airport and Mixed Land Use Plan for the re-development of the former Clark US Airforce Base. The plan proposes to transform the military complex into a modern world class international airport. The Airport and Mixed Land Use Plan proposes the development plans for Clark Airfield as an international gateway, airport for Metro Manila and the business plan for the Clark Special Economic Zone.

Conduct land use mapping and analysis to check suitability of land use with existing topographic characteristics.

Prepare interpretation of image processing.

KATIPUNAN AVENUE/AURORA BLVD. INTERCHANGE
Feb. 1995 to July 1995
Sr. Geodetic/Locating/Survey Engineer

Supervision of the construction of Katipunan Flyover and checked on the following:

- Bored pile location and elevation.
- Road way centerline, right-of-way, subgrade base course and PCCP elevation prior to overlay of each item.
- Manhole and drainage locations.
- Retaining wall from footing to top of construction joint.

Feb. 1994 to Feb. 1995

ROAD 4, A-3 CIRCUMFERENTIAL ROAD 5 (C-5), FORT BONIFACIO TO BUTING

A-2, CIRCUMFERENTIAL ROAD 5 (C-5) WEST REMBO TO E. RODRIGUEZ AVENUE, *Bagong Ilog, Pasig*

C-1 OF C-5, E. RODRIGUEZ AVENUE TO ORTIGAS AVENUE
Sr. Locating/Survey/Geodetic Engineer

Layout location and elevation of drainage, stakeout road right-of-way limits, check locations and elevations from sub to superstructures of Pasig A-2 (C-5). Horizontal and vertical control of road. Very much particular in checking the given design to meet DPWH requirements.

KATIPUNAN AVENUE/AURORA BLVD. INTERCHANGE (Detailed Engineering)
Oct. 1993 to Feb. 1994
Sr. Locating/Survey/Geodetic Engineer

Supervise ACRE Surveying and Development Co. in the field of topographic survey, cross sectioning every 20 meters interval up to the Road Right-of-Way limits, profile leveling, monumenting and check computation of field data to meet requirement. Topographic survey covers an area approximately 20 hectares.

ESTANCIA-AJUY AND ESTANCIA WHARF ROADS
Iloilo
July 1993 to Oct. 1993
Survey Engineer/Quantity Engineer

Prepare monthly progress report and computation of quantities for Monthly Billing Certificate to countercheck contractors report every last week of the month.

Supervise, check alignment and elevations prior to asphalt concrete paving.

RURAL INFRASTRUCTURE FUND PROJECT-ORAS PORT PROJECT, *Oras, Easter Samar*
May 1992 to July 1993
Survey Engineer/Quantity Engineer

Conduct overall planning, organization and supervision of all activities of the construction management services of Oras Port Eastern Samar component. Monitor work progress, qualification of results and preparation of periodic reports and project valuation for payments by the Clients. formulate projects' plan and programs.

Supervise the preparation of as-built drawings, final quantification and other documents pertinent to the final acceptance of payment by the Client.

EDSA-ORTIGAS AVENUE FLYOVER INTERCHANGE PROJECT, DPWH, CONSTRUCTION SUPERVISION
Oct. 1991 to May 1992
Sr. Geodetic/Locating/Survey Engineer

Construction of two 429 m. long, tow-lane third level left turning bridges along Epifanio delos Santos Avenue (EDSA) and Ortigas Ave. and reinforced concrete retaining walls, with a total length of 325 m. The project was envisioned to ease the traffic in one Metro Manila's busiest intersections by providing three levels of vehicular flow.

Responsible for the horizontal and vertical control points form structure to superstructure. Very familiar with rigid checking regarding alignment and especially for vertical elevations of these levels coating or pouring of concrete.

UPGRADING AIR SERVICES FOR GENERAL SANTOS CITY AIRPORT
May 1991 to Oct. 1991

Supervised a survey team in undertaking the topographic survey of the airport and the adjoining areas.

THE SAN FERNANDO AIRPORT FEASIBILITY STUDY, Philippine Assistance Program Support Project
March 1991 to May 1991
Sr. Geodetic Engineer

The project was undertaken to study the feasibility of expanding the San Fernando Airport at San Fernando, La Union. As the Senior Geodetic Engineer of the project, supervised a survey team that executed the topographic survey of the airport and the adjoined areas. Also responsible for the calculation of the required land area and the earthwork involved. Also made a land-use study of the areas around the airport.

EARTHQUAKE DAMAGED INFRASTRUCTURE REHABILITATION PROJECT including Carmen Bridge, *Pangasinan*
Sept. 1990 to March 1991
Locating/Survey Engineer

Repair and reconstruction of essential infrastructure damaged by the earthquakes that struck Luzon on 16 July 1990. The rehabilitation program was undertaken under the three levels; from basic emergency repair completed in

2 months to major reconstruction and development of new alternative roads completed in 2 to 5 years. TCGI was responsible for reconstruction work in Pangasinan Province.

Responsible for all survey such as Site Plan for Damaged School Buildings, Plan and Cross Sections of Roads, River crossing for bridges, Dams, spillways and breakwater from Central to Western towns of Pangasinan.

MANILA BATAAN COASTAL ROAD PROJECT
Feb. 1990 to Aug. 1990
Sr. Locating/Survey Engineer

The project involves the investigation of the viability of undertaking the proposed road linkage between Metro Manila and Subic Special Economic Zone.

Overall in-charge in the conduct of survey and quantity calculations of construction materials needed for the preliminary design of the project. Responsible in the inventory of highway locations, bridge sites and topographic surveys.

From Dec. 1988 : To Oct. 1989
Employer : L.M. VILLAREAL ENGINEERING SERVICES
Position Held :
Project Description/Duties :

NORTH LUZON EXPRESSWAY EXTENSION, STAGE 3, CAPAS, TARLAC TO TARLAC, TARLAC SECTION, Province of Tarlac Parcellary Survey
Chief Surveyor/Locating/Survey Engineer

In-charge of the parcellary survey of affected lots traverse of 60.0m width expressway, 3 interchanges and 9 road crossing overpasses.

ANGELES CITY OVER-ALL TOWN DRAINAGE STUDY AND LOCAL DRAINAGE, DETAILED DESIGN, PREMIUMED PROJECTS
Drainage Engineer

Prepare an overall town drainage master plan and detailed engineering design of local immediate action program for drainage components, including 5 river survey within the study area.

From Aug. 1979 : To April 1985
Employer : NETHERLANDS AIRPORT CONSULTANTS
Jeddah, Kingdom of Saudi Arabia

Position Held :
Project Description/Duties :

AIRPORT PROJECTS
Jeddah, Saudi Arabia
Locating Engineer/Chief Surveyor

Perform general surveys for alignments and level of earthwork, asphalt, concrete pavement and airfield lighting system.

Computation of quantities with quality control, redesign minor adjustment on alignments and grade to conform with actual field condition.

Drafting and topographic surveying.

Airport projects completed:

- Hail Military Airport
- King Abdul Aziz International Airport, Jeddah
- Dharan International Airport and Military Shelters for F-5 and F-16 War Planes
- Al Hasa Airport
- Gaissuma and TAIF Airport
- Tabuk, Medina, Gassim Airport
- Al Baha and Sulay-il Airport

From July 1978 : To July 1979
Employer : PACIFIC CONSULTANTS INTERNATIONAL CONSULTING ENGINEERS AND ARCHITECTS
Riyadh, Saudi Arabia

Position Held :
Project Description/Duties : **SULAY-IL NAJERAN ROAD, SECTION F-3**
Sr. Locating Engineer

In charge of all phases of construction survey including minor re-design of alignment and grade in connection with the highway construction check contractor's billing: topographic survey and drafting.

From April 1974 : To July 1978
Employer : PHILNOR CONSULTANTS AND PLANNERS, INC. NORCONSULT AS AND DEVELOPMENT CONST. CORP. OF THE PHILS. (DCCP)

Position Held :
Project Description/Duties : **MANILA NORTH EXPRESSWAY, CONTRACT 1 AND 2 STAGE 1**

MANILA NORTH EXPRESSWAY, CONTRACT 1, 2 AND 3 STAGE 3

Sr. Survey Engineer/Survey Party Chief

Conduct detailed engineering survey and mapping of Magalang Road as a basis for the detailed design of Angeles City - Magalang access road and interchange. Conduct the correct alignment and elevation of CMI auto-grader sensor prior to sub-grade cutting and stripping and check calculation of pay estimates, quantity of excavations, backfill and volume of concrete poured as submitted by the

Contractor.

From Sept. 1966 : To April 1974
Employer : PHILIPPINE ROCK PRODUCTS, INC.
Position Held :
Project Description/Duties :

UNITED STATES NAVAL STATION
Olongapo City

UNITED STATES CLARK AIR BASE
Angeles City

METRO MANILA AND SUBURB INCLUDING MANILA DOMESTIC AND INTERNATIONAL AIRPORT

MARCOPPER MINING, *Marinduque*

BICOL SOUTH ROAD PROJECT, *Camarines Sur*

BATAAN OIL REFINERY, *Limay, Bataan*

COTABATO-DAVAO ROAD PROJECT, *Mindanao*

Sr. Locating Engineer

Conduct surveys on roads, dams, sewerlines, airport and mining. Compute earthworks quantities for monthly billing, topographic and drafting.

From Sept. 1962 : To Sept. 1966
Employer : PHILIPPINE NATIONAL RAILWAYS
Tutuban, Manila

Position Held :
Project Description/Duties :

SORSOGON RAILROAD EXTENSION PROJECT
Albay to Sorsogon, Sorsogon
Sr. Locating Engineer

Finalized plans and sections for submission to the Manila Office. Compute earthwork quantities for partial collection of contractors. Railroad construction supervision with regards to surveying works.

From 1957 : To 1962
Employer : A. SORIANO Y CIA, MINING DEPARTMENT
ATLAS CONSOLIDATED MINING AND DEVELOPMENT CORP., *Cebu*

Position Held :
Project Description/Duties :

BAYAWAN COPPER PROSPECT
Negros Oriental

INTERNATIONAL ENGINEERING CORP.
Bislig, Surigao

Sr. Locating Engineer

Supervise diamond drilling, core logging on coal and barite deposits topographic survey, geological mapping, ore reserve computations and drafting.

From 1956 : To 1957
Employer : PHILIPPINE IRON MINES, INC.
Larap, Jose Panganiban, Camarines Norte

Position Held :
Project Description/Duties : **VARIOUS IN-HOUSE PROJECTS**
Surveyor and Geological Mapper

Geological mapping and prospecting, topographic surveys and drafting.

From 1954 : To 1956
Employer : MARSMAN AND COMPANY
Position Held :
Project Description/Duties : **SAN MAURICIO MINING COMPANY**
Jose Panganiban, Camarines Norte

PALAWAN QUICKSILVER MINES, INC.
Puerto Princesa, Palawan

PALAWAN CONSOLIDATED MINES, INC.
Puerto Princesa, Palawan

Transitman

Drafting and mine surveying.

1.	**Proposed Position**	:	Geotechnical Specialist
2.	**Name**	:	LEANDRO R. AGUDO
3.	**Date of Birth**	:	March 13, 1935
4.	**Nationality**	:	Filipino
5.	**Education**	:	B.S. in Mining Engineering Mapua Institute of Technology, 1957 Course on Soil and Rock Improvement Techniques including Geotextiles and Modern Piling Methods, Asian Institute of Technology, 1982, Bangkok, Thailand Registered Mining Engineer, No. 000141
6.	**Professional Trainings**	:	Modelling Systems (MOSS) Software (MX-Site, MX-Road),TCGI Engineers, Jan. 06 to 12, 1999 Suretrak Planning and Scheduling, TCGI Engineers, June 16 to 20, 1997 Primavera Project Scheduling, TCGI Engineers, July 29 to August 02, 1996 ISO 9000, Quality Management System, Philippine Trade Training Center Roxas Blvd., Manila, May 25, 1995 6th Annual Geological Convention, University of the Philippines, Quezon City, December 1-3, 1993 Training Course for the Conduct of Feasibility Study for Rural Roads, TCGI Engineers, March 09, 11, 16 and 18, 1993 Gabions and Geotextiles, Dept. of Public Works and Highways, Port Area, Manila, December 10, 1992 Advanced Geotechnical Training Course, Century Park Sheraton, Manila, Nov. 22 - Dec. 4, 1992 Materials Engineers Seminar, TCGI Engineers, July 25 to Oct. 24, 1992 Training Program for Laboratory Technicians, TCGI Engineers, August 10 to November 23, 1991 Environmental Protection Symposium, AIT, Diliman, Quezon City, June to July 1988 Austrian Technological Symposium Lectures, Manila Intercontinental, Makati, Oct. 1989 Short Course on Water Supply Management, Aberdeen Court, Quezon City, May 1982

Short Course on Water Resources Technology and Management. University of the Philippines, Quezon City, March 1982

Lectures on Rock Mechanics and Application in Hydroelectric Project Investigations, NPC, Manila, May 1977

Sensitivity Training for Managers and Middle Managers, NPC, Manila, November 1976

Supervisory Development Training, NPC, Manila, May - July 1976

Short Course on Applicability of Aerial Photos in the Study of Volcanic Activity, University of the Philippines, Quezon City, 1972

7. **Memberships in Professional Societies** :

Member, Philippine Society of Mining, Metallurgical and Geological Engineers (PSMMGE)

Member, Geological Society of the Philippines (GSP)

Past Director and Member, International Association of Engineering Geologist (Philippine Chapter)

Member, Committee for the Study of Fly Ash

Member, Technical Committee, Cotabato-Agusan River Basin Development Program (CARBDP)

Member, Task Force for Flood Control and Related Activities.

Senior Member, (Joint Technical Committee), Presidential Inter-Agency for the Re-Study of Marikina River (PICOREM)

8. **Languages** : English - Fluent
Filipino - Fluent

9. **Countries of Work Experience** : Philippines

10. **Years with the Firm** : 9.5 years

11. **Employment Record**

From Aug. 1998 : To Jan. 1999 *(5 man-months)*
Employer : PCGI ENGINEERS
Position Held :
Project Description/ : VISTA DE BAY PROJECT PHASE I
Duties : *Calamba, Laguna*
Sr. Geotechnical Engineer

The project refers to a 150 – ha. Property to be developed

into a high and medium-high residential subdivision. It consists of two hills masterplanned such that future homeowners will have vantage view of Laguna de Bay, Mount Makiling and the Metro Manila area.

The project owners envisioned the Subdivision to be environment-friendly, that is, road design and site grading conform closely with the existing topography. Some areas are allocated as view corridors, to be planted with trees and shrubs. The water reservoir will be built on-grade, with the hill's summit. Cables for utilities will be laid underground - for power, telephone and CATV. A spine road connecting the two hills will provide access to the site.

Review available reports including maps for programming additional investigation works for foundation and extraction of water from underground reservoir.

From Nov. 1997 : To July 1998 *(8 man-months)*
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : LIMA INDUSTRIAL ESTATE
Duties : *Lipa City and Malvar, Batangas*
Sr. Geotechnical Engineer

The project consists of horizontal and vertical structures with total area of 400 has. The project also includes structures as deepwell-drill work reservation tank, bridge/box culverts, road pavements, curbs and gutters, sidewalks, water supply system, complete with electrical and communication system.

Evaluate bids for drilling and testing of samples during the project soil investigation.

Supervise exploratory core drilling and sample gathering to be submitted for various tests in the laboratory.

Evaluate field investigation and laboratory test results for the preparation of geotechnical report for use during the design works.

From Aug. 1997 : To Nov. 1997 *(3 man-months)*
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : ISLAND PARK
Duties : *Dasmariñas, Cavite*
Sr. Geotechnical Engineer

The project calls for the site development of 160 hectares property of Brittany Estates Corporation located in Dasmariñas, Cavite.

Phase I of the project involved 70 has. with a road network of 10 kms. The main entrance included fountains on both sides of the main road. A lagoon

complements the round about at the main entrance.

Plan and supervise geotechnical program and monitor laboratory testing of soil, aggregates, concrete and other materials and give recommendations.

Prepare foundation analysis including soil-bearing capacity of the foundation.

Prepare geotechnical evaluation report and recommendations.

From July 1997 : To Aug. 1997 *(2 man-months)*
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : PARSONS BRINCKERHOFF SAMPAGUITA
Duties : INTERCHANGE PROJECT
Makati City
Sr. Geotechnical Engineer

The project involves the detailed design of the Upper and Lower Sampaguita Interchanges and Parking Structures: Temporary Access Ramp E1, Mabini Ramp, CD Road/W1/W2/E2, Ramp S1/S2/S3/S4 and McKinley at Fort Bonifacio.

Supervise drilling investigation.

Examine sludge and core materials collected from exploratory drilling for foundation.

Select representative soil and rock samples for various laboratory tests for purposes of design.

From Sept. 1996 : To June 1997 *(9 man-months)*
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : SPLENDIDO TAAL RESIDENTIAL, GOLF
Duties : AND RESORT CLUB PROJECT
Tanl. Batangas
Bulk Earthwork Superintendent

Supervise excavation for golf and residential areas.

Locate sources of materials for embankment including field and laboratory testing.

Supervise drilling for foundation and deepwells.

From June 1996 : To Aug. 1996 *(3 man-months)*
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : LOWER AGUSAN DEVELOPMENT PROJECT
Duties : *Agusan del Norte*
Engineering Geologist

Construction of two pumping stations: the Aupagan and

Bit-os including irrigation canals, drainage canals, related structures and on-farm facilities. The Bit-os Scheme includes 2-floor reinforced concrete pumphouse, 4-sets of vertical shaft type mixed-flow pumps, 19.48 km main canal, 21.48 km laterals, 2.91 km subslaterals, 33.0 km drainage canals, related structures and on-farm development such as main farm ditches, supplementary farm ditches, turnouts, farm drains and land leveling.

The Aupagan scheme consists of a 2-floor reinforced concrete (266 sq.m.) pumphouse building, 4 sets of vertical shaft type mixed –floor pump, 21.11 km main canal, 21.83 km laterals, 7.65 km. sub-laterals, 36.30 km drainage canals, related structures and on-farm development structures such as main farm ditches, supplementary farm ditches turnouts, farm drains and land leveling.

Prepare project geological map.

Supervise foundation investigation.

Prepare interior geological reports.

From Sept. 1995 : May 1996 *(8 man-months)*
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : BRIDGE REHABILITATION PROJECT
Duties : *Nationwide*
Sr. Geotechnical Engineer

Rehabilitation of bridges along the country's vital artery. Lined up for construction are 40 bridges which will require the funding and scheduling for the next few years. Twelve bridges under Phase I and 3 bridges under Phase II are under various stages of construction. These bridges are prestressed concrete girder type and range from 2 spans (23 m.) to 16 spans (about 560 m) in length.

Supervise drilling explorations and gathering of soil and rock samples for laboratory test.

From May 1994 : To July 1995 *(14 man-months)*
Employer : TCGI ENGINEERS
Position Held and
Project Description/ : BOHOL IRRIGATION PROJECT
Duties : *Bohol Island*
Engineering Geologist

Supervise drilling, water pressure testing and grouting at the sites for the dam, bathtub spillway and spillway dike including evaluation and prepare
recommendations for additional grouting when necessary.

Locate sources of construction materials for the dam embankment and for concrete aggregates.

Supervise and inspect foundation, excavations; check and scrutinize concrete requirements for the processing and approval of pouring permits.

Evaluate change orders and other claims of Contractors for approval.

Prepare final engineering geological report of Malinao Dam with recommendations for future works.

From Dec. 1993 : To March 1994 *(4 man-months)*
Employer : TCGI ENGINEERS
Position Held :
Project Description/ :
Duties : **C-5 ROAD PROJECT, KATIPUNAN BRIDGE AND FLYOVER**
Metro Manila
Sr. Geotechnical Engineer

Conduct surface geological mapping along the bridge and flyover alignments including delineation of Marikina fault.

Conduct studies of the major fault for assessment of seismic factor for the design of the proposed engineering structures.

Write engineering geological and geotechnical report of the project.

From March 1993 : To Dec. 1993 *(9 man-months)*
Employer : TCGI ENGINEERS
Position Held :
Project Description/ :
Duties : **BACON-MANITO POWER PLANT PROJECT**
Albay
Sr. Geotechnical Engineer

Supervise drilling explorations at site of the project. Assist in the preparation of the corresponding geotechnical evaluation reports.

From Aug. 1992 : To Feb. 1993 *(6 man-months)*
Employer : TCGI ENGINEERS
Position Held :
Project Description/ :
Duties : **SHELL PHILIPPINES PROJECT**
Lobo, Batangas
Sr. Geotechnical Engineer

Assist in the preparation of the tank foundation geotechnical report with recommendations.

Prepare proposals for soil investigation and laboratory works for plant and building structures.

Attend various engineering seminars.

From April 1992 : To July 1992 *(3 man-months)*
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : LUZON SMALL HYDROPOWER PROJECTS
Duties : *Luzon Island*
Sr. Engineering Geologist

Prepare project geological drawings and logs of test pits and borings.

Investigate sources of construction materials.

Recommend various laboratory tests on rock and soils samples gathered to obtain engineering properties for design purposes.

Small Hydroprojects completed were:

- Kanan B-1 Hydro Project
  Infanta, Quezon
- Nalatang A Hydro Project
  Benguet, Mt. Province
- Nalatang B Hydro Project
  Benguet, Mt. Province

From Jan. 1991 : To March 1992 *(14 man-months)*
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : SMALL WATER IMPOUNDING
Duties : MANAGEMENT PROJECTS DPWH
Nationwide
Sr. Foundation/Geotechnical Engineer

Program investigation works of 38 SWIM projects including laboratory testing in various locations nationwide.

Evaluate drilling and laboratory tests data to obtain parameters which where supplied to the design engineers.

Prepare joint comprehensive report on the mechanics and cause of dams failure in the provinces of Ilocos Sur, Nueva Ecija, Pampanga, Camarines Sur and Leyte del Norte.

From Oct. 1990 : To Jan. 1991 *(3 man-months)*
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : EARTHQUAKE-DAMAGED
Duties : INFRASTRUCTURE REHABILITATION PROJECT, DPWH
Pangasinan and Tarlac Provinces (including Carmen Bridge)
Sr. Geotechnical Engineer

Investigate sites of damaged infrastructures such as buildings, bridges and roads; program investigation and laboratory testing works.

Evaluate investigation data and prepare corresponding geotechnical reports including recommendations for final design of the project.

The project covered various subcomponents to include four school buildings, four bridges and three roads.

From Sept. 1990 : To Oct. 1990
Employer : TCGI ENGINEERS
Position Held :
Project Description/ :
Duties : **EARTHQUAKE-DAMAGED STRUCTURES ALONG AGNO RIVER AND ALLIED TRIBUTARIES SURVEY**
Benguet, Pangasinan
Sr. Geotechnical Engineer

Check banks of Agno River and its tributaries including adjacent areas.

Delineate extent/magnitude of damages as manifested both on the ground and on the structures.

Prepare drawings (with pictures) indicating the various damages for assessment and design.

From May 1990 : To June 1990 *(2 man-months)*
Employer : TCGI ENGINEERS
Position Held :
Project Description/ :
Duties : **C-5 ROAD PROJECT - PASIG-PATEROS BRIDGE, DPWH**
Pasig, Pateros,Metro Manila
Sr. Geotechnical Engineer

Review drilling investigation data along the proposed bridge alignments.

Check the bridge abutment foundation including mapping of the Marikina Fault passing near it as inferred from aerial photographs.

Assess all data available. Write evaluation report including recommendation of the final bridge alignment for design.

From March 1989 : To March 1990 *(12 man-months)*
Employer : TCGI ENGINEERS
Position Held :
Project Description/ :
Duties : **KENNON ROAD DISASTER PREVENTION PROJECT, DPWH** *Benguet, Mountain Province*
Sr. Geotechnical Engineer

Map various rock types along the 38-km long Kennon Road including joint patterns; assess rock and hydrogeological conditions.

Map more than 40 disaster areas with modes and

mechanics of failures identified.

Categorize disaster areas on the basis of failure, failure modes, terrain, groundwater conditions, etc. for prioritization of rehabilitation works. Prepare and tabulate rehabilitation measures including supports for a particular type of disaster.

Write evaluation report with recommendations on the type of support to be designed for a specific type of disaster.

From 1988 : To Feb. 1989
Employer : ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

Position Held :
Project Description/ : MAGAT RIVER MULTI-PURPOSE
Duties : PROJECT (NIA-360 MW), *San Mateo, Isabela*
Consulting Engineering Geologist/Geotechnical Engineer

Conduct site investigation and examination of cracks on spillway floor at the flip bucket area. Prepare preliminary report as to the possible evaluation of present conditions including recommendations.

Evaluate contractor's claims on payments or overbreaks. Determine justified and unjustified overbreaks based on geological and hydrogeological data, drilling and blasting reports.

Work at the National Irrigation Administration (NIA) from 1971 to 1973 and worked with the Consultant, U.S. Bureau of Reclamation. Prepare geologic maps and logs of test pits and drill holes. Prepare evaluation report for enclosures in the feasibility study report.

From 1988
Employer : ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

Position Held :
Project Description/ : ISLAND ROADS - PACKAGE 7A *(Iligan, Lanao*
Duties : *del Norte to* Aurora, *Zamboanga del Sur, Lanao & Zamboanga Provinces)*
Consulting Engineering Geologist and Geotechnical Engineer

Conduct detailed examination of foundation of bridges in Gumagagamot and Butadon sites after careful review of subsurface exploration and test piling results.

Calculate depth of scour and slope stability investigations at both sites to determine pile depths to support bridge foundations.

From 1987 : To 1989
Employer : ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

Position Held :
Project Description/ : ANGAT WATER SUPPLY OPTIMIZATION
Duties : (MWSS), *Bulacan Province and Quezon City*
Consulting Engineering Geologist

Program and supervise investigation works (geological mapping, core drilling and test pitting) at the sites of various engineering structures (7-km tunnel, outlet basins, 17-km aqueduct and treatment plant) and potential sources of construction materials. Conduct also investigations on alternative scheme (by pumping) at the site for the dam and water conveyance structures.

Evaluate geological drilling and laboratory test results and prepare foundation appraisals for design purposes. Prepare engineering- geological reports for feasibility, preliminary and detailed design studies. Supervise work force of two geologist and materials engineers.

Meet with ADB Consultants and implement special additional works e.g. gather soil and rock samples for laboratory testing to determine tunnel supports and obtain parameters for the design of tunnel boring machine.

Attend pre-bid conference with prospective Contractors and answer geological and geotechnical questions. Prepare drawings and addenda as part of the construction drawings.

From 1987 : To 1989
Employer : ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

Position Held :
Project Description/ : PHIL. LONG DISTANCE TELEPHONE
Duties : SPORTSCOMPLEX *Mandaluyong, Metro Manila*
Consulting Engineering Geologist and Geotechnical Engineer

Responsible for the programming and supervise detailed geological mapping, core drilling, and sampling for laboratory testing. Interpret tests results for design purposes. Prepare evaluation report for enclosure in the technical report for detailed design stage technical report.

From 1986 : To 1987
Employer : ENGINEERING AND DEVELOPMENT CORPORATION OF THE PHILIPPINES (EDCOP)

Position Held :
Project Description/ : BALIGATAN HYDRO-ELECTRIC PLANT (NIA
Duties : - 6 MW), *San Mateo, Isabela*
Consulting Engineering Geologist/
Sr. Geotechnical Engineer

Responsible for the investigation of tailrace tunnel and

spillway outlet channels for erosion/scouring studies of the embankment.

Conduct investigation of high slopes for stability studies.

From 1986
Employer : ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

Position Held :
Project Description/ :
Duties : BATANGAS COAL FIRED THERMAL PROJECT (NPC - 300 MW) , *Calaca, Batangas.*
Consulting Mining Engineer

Review results for surface and subsurface investigation works for design purposes.

Conduct investigations at Semirara Mining Corporation, Unong Pit for fuel supply. Program and supervise sampling works to confirm previous findings by laboratory testing of representative samples for the equipment (generating units) design.

FOURTH MINDANAO IRRIGATION STUDY (NIA-MIS IV) *North Cotabato, Cotabato*
Consulting Engineering Geologist and Soils/Materials Engineer

Responsible for the conduct of geological mapping and subsurface exploration of foundations of engineering structures and sources of construction materials. Prepare foundation appraisals and evaluate laboratory tests and other tests results for design purposes. Prepare engineering-geological reports for feasibility and detailed design studies.

From 1986 : To 1987
Employer : ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

Position Held :
Project Description/ : UPLAND ACCESS PROJECT
Duties : *Various Location, Mt. Province*
Consulting Engineering Geologist and Geotechnical Engineer

Conduct detailed investigations at various sites of trail suspension bridges (proposed and existing) including foundation appraisals for design and rehabilitation purposes (USAID financed).

Conduct lectures to Department of Local Government (DLG) engineers on site selection and various investigation works composing of topographic survey, geological and geotechnical investigation, hydrological investigations and laboratory testing of samples results to be used for design purposes. Lectures also include general principles of bridge planning and design, bridge type selection, placing

of anchorage blocks and foundations, anchorage bars, design factors and slope protection.

Prepare examples for stability analysis of rock slopes for bridge foundation using polar diagrams.

ISLAND ROADS - PACKAGE 7A
Lanao del Norte Aurora, Zamboanga del Sur
Engineering Geologist/Geotechnical Engineer

Conduct detailed examination of foundation of bridges in Gumagagamot and Butadon sites. Review subsurface exploration and test piling results.

Calculate depth of scour and slope stability investigations at both sites to determine pile depths to support bridge foundations.

From 1984
Employer : ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

Position Held :
Project Description/ :
Duties : TAILINGS DAM - HINOBAAN MINES
Negros Occidental, Feasibility Study
Consulting Engineering Geologist and Geotechnical Engineer

Supervise geological mapping, drilling investigation works and foundation appraisal. Prepare evaluation report.

From 1984
Employer : ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

Position Held :
Project Description/ : NASIG-ID SWIM PROJECT
Duties : National Irrigation Administration (NIA)
Consulting Engineering Geologist and Hydrogeologist

Conduct siting of dam. Prepare and supervise investigation works at the dam site and other related structures including sources of construction materials. Evaluate geological and drilling data including laboratory tests results for design purposes. Prepare evaluation report for enclosure in the feasibility study report.

From 1984
Employer : ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

Position Held :
Project Description/ : BARAS SWIM PROJECT, NIA, Feasibility
Duties Study, NIA
Consulting Engineering Geologist/Materials Engineer

Conduct siting of dam. Prepare and supervise investigation works at the site for the dam and other related structures including sources of construction materials. Evaluate geological and drilling data including laboratory

tests results for design purposes. Prepare evaluation report for enclosure in the feasibility study report.

MIRAL SWIM PROJECT, National Irrigation Administration Feasibility Study
Consulting Engineering Geologist/Materials Engineer

Program and supervise surface and subsurface investigation works. Interpret results including laboratory test results for design purposes. Prepare evaluation reports.

CAMIGUIN MINI-HYDRO PROJECT
Camaguin Island, Misamis Oriental
Feasibility Study, NIA
Consulting Engineering Geologist

Program and supervise geological mapping and core drilling exploration at the sites of the proposed engineering structures and sources of construction materials. Test results on rock and soil samples were evaluated/interpreted for design purposes. Prepare reports for enclosure in the Feasibility Study Report.

KEDUNG OMBO DAM & IRRIGATION PROJECT,
Central Java, Indonesia
Pre-Bidding Site Investigation
Consulting Engineering Geologist & Geotechnical Engineer

Review geological and drilling data. Conduct site investigations including sources of construction materials.

Prepare bedrock contour plans to determine suitable foundation levels and excavation volumes at the sites for the dam, spillway, tunnel portals and amount of rock materials at the quarry.

CARAMOAN DENDRO THERMAL PROJECT
Caramoan, Camamoan, Camarines Sur

MASELCO DENDRO THERMAL PROJECT
Mobo, Masbate
Geologist and Geotechnical Engineer

Conduct detailed joint survey and reviewed borehole logs to determine sound and stable foundation for the proposed powerhouse and cableway structures. Investigate sources of construction materials and gather samples for laboratory testing, results of which are used for design purposes.

From 1981 : To 1982
Employer : ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

Position Held :
Project Description/ :
Duties :

PULANGUI RIVER NO. 4 HYDRO-ELECTRIC PROJECT (NPC-255 MW)
San Carlos, Bukidnon
Consulting Geo-techanical Engineer

Responsible for the investigation for sources of construction materials. Conduct investigation of high slopes for purposes of stability analysis.

From 1981 : To 1982
Employer : ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

Position Held :
Project Description/ :
Duties :

HIBULANGAN SWIM PROJECT (NIA)
Villaba, Leyte
Consulting Engineering Geologist/Geotechnical Engineer

Responsible for the preparation of work programs for the investigation of sites for the dam and sources of construction materials. Evaluate geological and drilling data including laboratory test results for design purposes.

Write evaluation report on "Geology" and Construction Materials" including recommendations for enclosure in the technical feasibility report.

DAWARA MINI-HYDRO PROJECT (NEA)
Suyo, Ilocos Sur
Consulting Engineering Geologist/Hydrogeologist

Conduct detailed joint surveys and made foundation appraisals at the sites for the dam, penstock (thrust block section) and powerhouse.

DAVAO UNION CEMENT CORP. PORT PROJECT, *Ilang, Davao City*
Consulting Engineering Geologist and Geotechnical Engineer

Program surface and subsurface investigation works (detailed geological mapping and core drilling) including supervision. Evaluate engineering-geological data and laboratory test results for design purposes.

From 1981
Employer : ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

Position Held :
Project Description/ :
Duties : MACTAN INTERNATIONAL AIRPORT
Mactan, Cebu
Consulting Engineering Geologist

Program and supervise investigation works along the existing and alternative runway alignments.

From 1981
Employer : ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

Position Held :
Project Description/ :
Duties :

PASAR PORTS FEASIBILITY STUDY
Isabel Leyte
Consulting Engineering Geologist/Hydro-geologist

Conduct reconnaissance investigations of water supply sources from surface water and from underground reservoirs. Recommend blanketting of reservoir area located in limestone and shale sandstone formations.

KALAYAAN PUMPED STORAGE PROJECT (NPC - 300 MW)
Lumban, Laguna
Consulting Engineering Geologist/Hydrogeologist

Review geological and hydrogeological data, drilling results and reports. Conduct site investigation works.

Conduct special hydrogeological investigation to determine the ground water situation of project sites.

Evaluate hydrometeorological data in correlation with ground water geology investigations to obtain values of potential/actual ground water flow.

Interpret and evaluate data gathered and wrote environmental impact statement report on sliding, erosion and groundwater depletion including mitigation measures.

RECONNAISSANCE INVESTIGATION OF MINI-HYDRO ELECTRIC PROJECTS, NIA
Consulting Engineering Geologist

Investigate location of damsites and sources of construction materials in Guimba, Talugtog and Gabaldon, Nueva Ecijá, and in Bamban, Tarlac.

Prepare preliminary evaluation report for each site.

WANGAG SMALL WATER IMPOUNDING (SWIM) PROJECT NATIONAL IRRIGATION ADMINISTRATION
Feasibility Study
Consulting Engineering Geologist

Conduct joint survey and supervise damsite subsurface exploration. Make foundation appraisal and interpretation.

From 1979 To 1981
Employer ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

Position Held PULANGUI RIVER NO. 3 HYDRO-ELECTRIC
Project Description/ PROJECT (NPC -90 MW)
Duties *Valencia, Bukidnon*
Consulting Engineering Geologist and Geomechanics Engineer

Supervise and responsible for geological mapping, sub-surface exploration and evaluation of data. Interpret engineering-geological data and laboratory tests results for design purposes. Other responsibilities include joint survey, slope stability investigations and design of cut slopes, and foundation appraisal. Prepare *grouting* plans and *grouting* guidelines for foundation treatment.

Write evaluation report on "Geology and Construction Materials" for enclosure in the technical feasibility report. Supervise a work force of two (2) senior geologists and three (3) geologists.

From 1978 ENGINEERS & DEVELOPMENT CORP. OF THE
Employer PHILIPPINES (EDCOP)

Position Held AGUS RIVER NO. 1 HYDRO-ELECTRIC
Project Description/ PROJECT (NPC - 80 MW)
Duties *Marawi City, Lanao del Sur*
Staff Geologist

Work closely with NPC engineers and geologists in the interpretation of geological and hydrological data. Make recommendations on programs and remedial measures such as *grouting* works for large seepages and major cave-ins.

Conduct joint surveys, assess tunnel conditions and recommend support systems.

INVESTIGATION OF GROUNDWATER RESOURCES FOR WATER SUPPLY
Lime Plant, Guimaras, Iloilo
Consulting Hydrogeologist

Conduct geological and hydrogeological investigations. Supervise well drilling and interpret pumping tests results for sizing of the pump.

Prepare evaluation report.

From Nov. 1977
Employer
Position Held
Project Description/
Duties

To May 1978
NATIONAL POWER CORPORATION (NPC)

AMBUKLAO HYDRO-ELECTRIC PLANT REHABILITATIOIN WORKS PROJECT (NPC - 75 MW), *Benguet, Mt. Province*
Staff Geologist & Acting Chief, Geology Division

Assist the NPC Consultant in the installation of instruments for monitoring the rock creep of the left abutment spillway.

Review detailed joint surveys and periodic instrument readings for slope stability investigation.

KALAYAAN PUMPED STORAGE PROJECT (NPC - 300 MW), *Lumban, Laguna*

Review geological and hydrogeological data, drilling results and reports. Conduct site investigation works.

Interpret and evaluate data and write environmental impact statement report on sliding, erosion and groundwater depletion including mitigation measures.

From 1977
Employer

Position Held
Project Description/
Duties

ENGINEERS & DEVELOPMENT CORP. OF THE PHILIPPINES (EDCOP)

DOWNSTREAM MAKULAPNIT DAM - CONSTRUCTION PHASE
Sta. Cruz, Marinduque
Consulting Engineering Geologist

Appraise of dam of foundation materials after site investigation. Review geological maps and results of drilling and water pressure tests and determine whether grouting will still be necessary for the dam foundation.

EROSION CONTROL AT TREATMENT PLANT, *Clark Airbase, Pampanga*
Consulting Engineering Geologist

Supervise the investigations works and make foundation appraisal. Work closely with civil engineers in data interpretations for design purposes.

SUMMA-KUMAGAI PROJECT
Norzagaray, Bulacan
Consulting Engineering Geologist and Materials Engineer

Investigate sources of construction materials and gather samples on laboratory testing. Evaluate results and determine volumes.

From 1976 : To 1977
Employer : NATIONAL POWER CORPORATION
Position Held :
Project Description/ : TIWI GEOTHERMAL PROJECT (NPC - 330
Duties : MW), *Tiwi, Alabay*

MAKILING BANAHAW GEOTHERMAL PROJECT
(NPC - 330 MW); *Los Baños, Laguna*
Consulting Engineering Geologist

Review geological, hydrogeological and seismic data, drilling results and reports. Conduct fieldwork at the project sites.

Interpret and evaluate data and write environmental impact statement report on sliding, erosion, subsidence, groundwater depletion and seismicity of the project areas.

From 1976 : NATIONAL POWER CORPORATION
Employer :
Position Held :
Project Description/ : LAND CONSERVATION AND
Duties : DEVELOPMENT PROJECT
Land Bank of the Philippines, Manila
Consulting Engineering Geologist and Materials Engineer

Prepare investigation programs for the damsites and related structures including sources of construction materials. Supervise investigation programs and assess geological drilling, laboratory test results for design purposes. Prepare evaluation report for the pre-investment feasibility study.

From 1974 : To 1976
Employer : NATIONAL POWER CORPORATION
Position Held :
Project Description/ : UPSTREAM MAKULAPNIT TAILINGS DAM
Duties : PROJECT, *Sta. Cruz, Marinduque*
Consulting Engineering Geologist

Supervise damsite surface and subsurface investigation works and made foundation appraisal. Prepare grouting plans for implementation, drilling and grouting activities and recommended additional holes and specifying depths, inclinations and grout mixes and pressure to be used. The dam is 144.0 meters high and serves as a storage for water supply.

From 1972 : To 1977
Employer : NATIONAL POWER CORPORATION
Position Held :
Project Description/ : BAGO RIVER HYDRO-ELECTRIC PROJECT
Duties : (NPC - 55 MW), *Bago, Negros Oriental*
Supervising Geologist

Conduct reconnaissance investigation works with

Lahmeyer International, Germany (NPC Consultant) at the damsite. Probable sources of construction materials were identified.

PANIQUIAN DAM
Mariveles, Bataan
Supervising Geologist

Conduct foundation appraisal and joint survey for slope stability investigations.

Locate sources of construction materials and determinate quantities.

AMLAN RIVER HYDROELECTRIC PLANT
Amlan, Negros Oriental
Supervising Geologist

Conduct surface mapping and supervise subsurface investigations to determine cause of slide. Programmed rehabilitation measures for iimplementation.

OPTIMIZATION STUDY OF LUZON RIVERS (NPC), *Luzon Island, Philippines*
Supervising Geologist

Work with Lahmeyer International, Germany (NPC Consultant). Work closely with Lahmeyer Geologist and Design Engineer. Conduct semi-detailed geological investigations along various river basins at potential damsites including location of sources of construction materials. Make joint surveys for slope stability investigations using polar diagrams. Forty five (45) damsites were studied located along Marikina River in Rizal; Kaliwa-Kanan River in Quezon; Pinacananan de Tumauni, Pinacananan de Tuguegarao River in Cagayan; Pasil, Saltan and Abulog Rivers in Kalinga-Apayao; Amburayan River in Abra and Agno River in Mt. Province and Pangasinan. Priorities given on:

a. Abulog River Nos. 1, 2, 3, and 4 HE Projects (NPC - Total, 500 MW)
b. Agno River Nos. 3, 4, 5 and 6 HE Projects (NPC - Total, 700 MW)
c. San Roque HE Project (NPC - 390 MW)
d. Sapinit HE Project (NPC - 150 MW)
e. Casecnan Trans-Basin Project (NPC - 268 MW)

CHICO RIVER NO. 2 HYDRO-ELECTRIC PROJECT (NPC - 240 MW), *Sadanga, Mt. Province*
Supervising Geologist

Work with Lahmeyer International, Germany (NPC Consultant) for the feasibility study of the multi-purpose project. Assist in the preparation of work programs for surface and subsurface geological explorations including specifications for rock mechanics investigations at the

damsite.

Conduct detailed joint surveys for slope stability investigation.

AGNO RIVER NOS. 3, 4, 5, 6 AND SAN ROQUE AND SAPINIT HYDRO-ELECTRIC PROJECTS (NPC)
Various Locations, Pangasinan
Supervising Geologist

Work with ELC-Electroconsult, Italy (NPC Consultant) in the reconnaissance investigation. Conduct semi-detailed mapping at the damsites including location of sources of construction materials.

PANTABANGAN HYDRO-ELECTRIC PROJECT (NIA - 100 MW), *Pantabangan, Nueva Ecija*
Supervising Geologist

Assign at the project site per NIA request and worked closely with the Contractor Tunnel Engineer to devise methods in tunnelling low dipping and slaking shale formation along the diversion tunnels.

AGUS RIVER NO. 6 HYDRO-ELECTRIC PROJECT (NPC - 300 MW), *Iligan City, Lanao del Norte*
Supervising Geologist

Examine powerhouse excavation, seepage points and seepage characteristics. Prepare drilling and *grouting* plans including guidelines as to drilling depths, grout mixes and grouting pressures for seepage elimination.

CHICO RIVER NOS. 1, 2, 3 AND 4 HYDRO-ELECTRIC PROJECTS (NPC - TOTAL, 740 MW)
Various Locations, Mt. Province
Supervising Geologist

Work with Lahmeyer International, Germany, (NPC Consultant) for the pre-feasibility study of the project. Conduct semi-detailed investigations at the damsite including location of sources of construction materials.

Assist in the preparation of work programs including duration and costs for the surface and subsurface investigations of the four damsites during the feasibility study stage.

GEOTHERMAL AREAS OF THE PHILIPPINES
Various Locations
Supervising Geologist

Reconnaissance investigations of steam fields throughout the Philippines including visits to existing plants.

PHILIPPINE NUCLEAR POWER PROJECT NO. 1
(NPC - 620 MW), *Bagac, Bataan*
Supervising Geologist

Prepare site selection for the project in the provinces of Laguna, Batangas and Bataan.

Conduct detailed surface and subsurface investigations (resistivity survey and boring) for foundation design.

BOHOL NO. DIESEL PROJECT
Tagbilaran, Bohol

AMLAN DIESEL PROJECT
Amlan, Negros Oriental

PANAY DIESEL PROJECT
Dingle, Iloilo

CEBU NO. 1 DIESEL PROJECT

SIPALAY DIESEL PROJECT
Sipalay, Negros Oriental

JASAAN DIESEL PROJECT
Villanueva, Misamis Oriental

CEBU NO. 1 THERMAL PROJECT (NPC - TOTAL, 382.2 MW)
Supervising Geologist, NPC

Locate sites for sources of water supply from surface water and underground reservoirs. Supervise investigation works for both sources.

Interpret drilling results for well design and results of pumping tests for sizing of pumps and setting depths. Make foundation appraisal for the dam, interpret drilling water pressure tests results for seepage studies from dam reservoirs.

Take water samples for quality analyses.

From 1971 : To 1974
Employer : NATIONAL POWER CORPORATION
Position Held :
Project Description/ Duties : MAGAT RIVER MULTI-PURPOSE PROJECT
(NIA - 360 MW), *San Mateo, Isabela*
Consulting Engineering Geologist and Geotechnical Engineer

Site investigation and examination of cracks at spillway floor at the flip bucket area. Prepare preliminary report as to the possible causes of cracking of concrete and evaluate present conditions including recommendations.

Evaluate Contractor's claims on payments for overbreaks.

Determine justified and unjustified overbreaks based on geological and hydrogeological data, drilling and blasting reports.

Prepare geologic maps and logs of test pits and drill holes.

From May 1960 : To Oct. 1970
Employer : NATIONAL POWER CORPORATION
Position Held :
Project Description/ : PRIME WHITE CEMENT CORP. PROJECT
Duties : *Asturias, Cebu*
Consulting Engineering Geologist

Conduct detailed geological mapping including supervision of plant site subsurface exploration. Make foundation appraisal for the plant and write engineering-geological reports for inclusion in the feasibility and detailed design reports.

From 1968
Employer : NATIONAL POWER CORPORATION
Position Held :
Project Description/ : MALUBOG CONCRETE DAM
Duties : *Toledo, Cebu*
Consulting Engineering Geologist

Conduct site geological mapping including review of boring data and water pressure test results.

Prepare grouting plans showing hole pattern, depth and spacing, grout mixture and pressure for foundation treatment.

From 1967
Employer : NATIONAL POWER CORPORATION
Position Held :
Project Description/ : SIGPIT CONCRETE OVERFLOW DAM
Duties : PROJECT, *Toledo, Cebu*
Consulting Engineering Geologist

Conduct semi-detailed joint survey. Examine borehole cores and water pressure tests.

Prepare grouting plans which include depth and spacing of holes grout mixture and pressures applied for seepage control.

From 1960 : To 1972
Employer : NATIONAL POWER CORPORATION
Position Held :
Project Description/ : CASECNAN TRANS-BASIN PROJECT (NIA –
Duties : 115 MW), *Arilao, Nueva Vizcaya*
Geologist

Responsible for the reconnaissance investigation works. Prepare preliminary engineering-geological report of the project.

Feb.1981 to Feb. 1982

OFFICE OF THE SPECIAL PROJECTS MWSS-DCCD
Resident Engineer/Designer

Jan. 1980 to Feb. 1981

MINDORO INTEGRATED RURAL DEVELOPMENT OFFICE
Sr. Hydrologist/Resident Engineer

Professional Experience

April 1999 to Present

CENTRAL VISAYAS AIPORT PROJECT
Deputy Project Manager

Review of contract document and plans, to generate time-framed schedule and budgetary resumes for the conduct of Master Planning and Feasibility Studies (Bais Airport and Panglao Airport).

Coordinate and supervise daily activities of each Consultant/Specialist, in accordance with defined objectives, to meet both the target schedule and quality of results.

Evaluate specific outputs of each specialist relative to conceptual design of Airport facilities. This includes traffic demand, atmosphere conditions, technical features of aircrafts, geological and topographic conditions, social and environmental factors and other crucial considerations in the conduct of project Feasibility Study.

Assimilate technical data in joint effort with expatriate specialist (Canadian Airport Planner and a Japanese Airport Operation Specialist), in the preparation of study reports.

Review of various technical references in the design and operation of airport facilities i.e. ICAO, FAA, CAA and IATA, publications, FIDIC and provisions of PD 1594 (as revised).

Study, plan and prepare resources scheduling, for event milestones of the study.

Conduct scooping services for the preparation of Environmental Impact Assessment Report and eventually the issuance of ECC.

Coordinate with line agencies as to existing programs and available data.

Supervise preparation of Airport Master Plan (Bais and Panglao Airport) and conduct of the Feasibility Study.

NEGROS OCCIDENTAL SOLID WASTE MANAGEMENT PROJECTS (BACOLOD CITY, BAGO CITY, AND SAGAY CITY)

Conduct related hydrology survey and analysis of nominated landfill sites for each LGU.

Formulate site selection criteria in accordance with the DENR requirements.

Assist the Project Manager in programming various Technical Reports as port of the Feasibility Study of each SWM Facility.

Interact with various Specialist during site investigations and succeeding study, including hydrogeologist, geologist (soil materials) and sociologists.

Nov. 1999 to Dec. 1999

UPGRADING OF NAIA, RUNWAY 06/24
Asst. Team Leader

- Conduct ocular inspection and on-site condition of Runway 06/24, which is the major component of the Ninoy Aquino International Airport.
- Prepare pavement analysis and operational state of drainage facilities.
- Conduct in-depth study and analysis of appropriate construction and rehabilitation methodology in accordance with international standards.
- Research and link up with airport Operation Specialist, and Material Experts, as to specific stuffs that would satisfy the given conditions.
- Prepare final report and presentation materials to the Client, for acceptance.
- Consistent with the "non-stop operation" criteria of the client.

March 1999 to Oct. 1999

SUBIC BAY AREA MUN.
DEVELOPMENT PROJECT (SBA/MDP)
Cost and Specifications Specialist

The project involved the development of the Subic Bay corridors ranging to urban roads, bridges, solid waste facilities, public market, water supply components and procurement of equipment.

Review and re-qualify project feasibility study reports (done by others), based on contemporary indices.

Conduct post-feasibility inspection of identified projects for each LGU, and confer the priority and actual needs of the LGU.

Interact with other specialist, in the preparation of economic and financial analysis/ reports for each subprojects.

Review of conceptual and implementation details of sub-projects reference FIDIC, PD 1594 and various trade standards as basis for preparing the project specifications and contract conditions for prospective contractors.

Participate in public consultation meetings as to project details, and user's

benefits.

Jan. 1999 to March 1999

COTABATO RIVER BASIN-MASTER DEVELOPMENT PLAN
Team Leader, TCGI Engineers

The project is a joint venture with Nippon Koei, Philkoei, and DCCD

The project aims to formulate a Master Development Plan for the Cotabato River. Base including the Liguasan Marsh.

Conduct data gathering (secondary) in the field consistent with the work plan.

Study base maps (NAMRIA) to correlate various water resources within the site.

Participate in coordination meetings with water resources specialists.

Review and study of existing develop master plan for the various water resources in the area.

Dec. 1998 to Feb. 1999

MONTE REAL PROJECT
Sr. Hydrologist

The Monte Real Project is to be developed into a high quality sustainable residential estate, which concerns for quality, comfort and well being of residents. It is located in Barangay Langub about 4 kms. from the center of Davao City.

Conduct hydrologic and hydraulic analysis of various existing drainage structures for the site development project.

Conduct preliminary and detailed investigation of drainage structures and inventory and evaluation of existing drainage structures.

Nov. 1992 to Dec. 1998

RURAL INFRASTRUCTURE FUND PROJECT

- ***Balete Road Project**, Feb. 1996 to Dec. 1998*
- ***Kalibo Highway IB Road Project** (Lanot-Pres. Roxas Section), May 1994 to Feb. 1996*
- ***Kalibo Highway IA Road Project** (Pres. Roxas-Estancia Section), Feb. 1993 to May 1994*
- ***Madella-Casiguran Road**, Nov. 1992 to Feb. 1993*

Resident Engineer

Perform the overall planning, organization and supervision of all activities of the construction management services of projects undertaken in accordance with PD/594, FIDIC, construction plans and engineering design. Monitor work progress, quantification of results and preparation of periodic reports and project valuation for payments by the Clients. Formulate project's plans and programs.

Perform contract management in behalf of the client (DPWH), insures of that contractual rights of participating parties are fairly scope guarded.

Supervise the preparation of as-built drawings, final quantification and other documents pertinent to the final acceptance and payment by the Client.

Jan. 1990 to 1992

RURAL INFRASTRUCTURE FUND PROJECT, ROADS COMPONENT, NATIONWIDE
Sr. Hydrologist/Drainage Engineer

Feasibility study, design and construction of roads, bridges and ports nationwide. These projects directly impact on national parks, watershed reserves, potential tourist areas, habitat or endangered flora and fauna, areas occupied by cultural minorities, mangroves and/or coral reefs. The environmental effects and economic benefits of such projects carefully studied.

Conduct road reconnaissance surveys, to identify most feasible road alignment in coordination with district engineering office and other line agencies.

Conduct detailed inventory of drainage structures (including bridges and other hydrologic/hydraulic parameters for both preliminary and final design of road drainage system.

Prepare field reports, and data inputs for both feasibility and detailed design.

Prepare detailed design of drainage structures ranging from culverts, ditches to bridge structures.

Conduct hydrologic and hydraulic analysis of various existing drainage structures in various road sub-projects.

Perform computer works relative to HEC-1 program.

Nov. 1987 to Dec. 1989

MARINA BAYHOMES PROJECT STAGE I
Project Manager/ Engineering & Control/ Manager

Provide technical management in all aspects of engineering works like: planning, scheduling, cost analysis, quality control, design, survey, architectural drafting and layouts, material bill of quantities and shop drawings.

Review, evaluate and supervise the preparation of drainage and water supply plans, hydrological survey and studies, and design of roads, highways, bridges, hydraulic structures and other related civil works structures.

Participate in periodic meetings with client or owner, sub-contractors, management committee and consultants.

Exercise value engineering in decision making by management team.

Prepare technical reports/correspondence for board meetings, clients.

Ensure effective contract management, processing of claims, change orders and extra works in accordance with FIDIC guidelines

June 1984 to Nov. 1987

IRRIGATION DAM AND DRAINAGE CANALS PROJECT, NATIONAL IRRIGATION ADMINISTRATION
Project Manager/ Engineering & Control Manager

Perform effective management and supervision of the project team which are tasked to provide engineering support services to the project.

Consistent with international standards (FIDIC) and government guidelines (PD 1594).

Take charge of rainfall intensity- frequency-duration studies, stream flow analysis, river discharge and flood depths, location and orientation of the drainage structures.

Supervise the preparation of design with emphasis on dewatering problem and embankment system. Also, the design of circumferential road and drainage canals.

Take active role in the disposal of a project manager's function, in an assistant capacity.

Prepare technical correspondence for client, top management and board.

Ensure efficient contract management, claim submittal and approval was tasked to document a P13M dewatering claim.

Liaise with owner, other government agencies for an efficient working relation.

Preside on project operation meetings concentrating in various construction scheme.

May 1983 to May 1984

HAIFA III HOUSING PROJECT
Project In-Charge

Perform manpower supervision of personnel assigned to the project, prepare technical correspondence for client, top management and board.

Ensure high work quality of all architectural finishing works.

Prepare bill of materials - marble (Italian), terrazzo tiles, ceramic tiles, gypsum lime and other finishing materials.

Review work contract and ensure effective implementation of same.

Prepare technical and financial reports for top management information.

Attend top management meetings, mingling with various european firms.

Negotiate and process change orders and extra works.

Negotiate additional work contracts for the company in an effort to generate additional income.

Nov. 1982 to March 1983

MUGDADIYAN IRRIGATION PROJECT
Project Manager

Provide technical management in the implementation of the various activities of the project and liaise with Owner and other concerned agencies for an efficient working relation.

Discuss with government and main contractor/consultants the technical details of the project within the framework of FIDIC and British standards.

Conduct various reference inspections to other contractors mostly Indian nationalities and Chinese.

Participate in weekly top management meetings at the Regional Headquarters.

In-charge of preparing technical reports and documentaries for the central office management committee.

Assist in the Project Manager and Operation Manager close working relationship among Filipino workers inside the camp and work site, zeroing on at the least gap between them and management.

March to Nov. 1982

HYDROPOWER, PORTS, INDUSTRIAL BUILDINGS, WATERLINE AND TRANSMISSION LINES PROJECTS, PUBLIC ESTATE AUTHORITY
Supervisor

Conduct project inspection all over the country from Mindanao to the Ilocos Region to evaluate actual progress of works and assess project on operation, particularly as to contractual compliance.

Monitor and evaluate project reports and consolidate same for top management consumption.

Feb. 1981 to Feb. 1982

MANILA WATERWORKS SEWERAGE SYSTEM PHD-I PROJECT, Project Consultants the Kampas-Frueggu and DCCD
Resident/Design Engineer

Ensure strict compliance of work implementation by contractor to project plans and specifications, reference FIDIC, AWWA and the government regulatory policies.

Check and evaluate accomplishment billings.

Conduct various laboratory tests for concrete mix, rebars, pipes (RCP) and also leakage tests.

Interest with various community organizations to effect smooth progress

of the job.

Responsible for a complete design of one pilot area - the Dapital Mayon St. area, that is the drainage improvement system.

Supervise and administer the defined role of work inspectors.

Jan. 1980 to Feb. 1981

CALAPAN PORT, WATERSHEDS ROADS AND IRRIGATION CANALS, AND HEALTH CENTERS PROJECT, MINDORO INTEGRATED RURAL DEVELOPMENT OFFICE (MIRDO)
Sr. Hydrologist/Resident Engineer

Monitor and inspect all developmental projects in the island of Mindoro. Responsible for the complete design and construction implementation of the projects.

1.	**Proposed Position**	:	**Airport Design Architect**
2.	**Name**	:	**ROSWEL P. MARASIGAN**
3.	**Date of Birth**	:	January 26, 1964
4.	**Nationality**	:	Filipino
5.	**Education**	:	B.S. Architecture Far Eastern University, March 1984 Licensed Architect No. 9931
6.	**Seminars/Trainings Attended**	:	Construction Project Management - DCV System/UPRC Estimating/PERT CPM - DCV System/UPRC R.C. Formworks System - DMCI Construction Management & Project Supervision - DMCI Computer Aided Design - Ateneo de Manila UAP CPE Seminars - United Architects of the Phils.
7.	**Language & Degree of Proficiency**	: :	English - Fluent Filipino - Fluent
8.	**Membership in Professional Organizations**	:	United Architect of the Philippines, Member
9.	**Countries of Work Experience**	:	Philippines
10.	**Years with the Firm**	:	5 years
11.	**Employment Record**		
	From Sept. 1994	:	To Present
	Employer	:	TCGI ENGINEERS
	Position Held and Description of Duties	:	**Sr. Architect** Coordinate architectural works with other disciplines in terms of providing and securing information to be incorporated in the project. Check and review architectural and engineering drawings and mark up discrepancies and advise other disciplines about discrepancies in drawings. Coordinate preparation of presentation and perspective work and production drawings in terms of providing all architectural details, schedules, mark up, checking all information and cross-referencing of all drawings.

Attend scooping conference and on board review meetings and prepare minutes of meetings and correspondence.

From Oct. 1993 : To Aug. 1994
Employer : APCO INTERNATIONAL, INC.
Position Held and Description of Duties : **Architect**

Preparation of design documents.

Evaluate schematic design.

Prepare planning and design of proposed assigned projects.

Prepare tender drawing, building permit drawing and planning permit drawing.

From Aug. 1989 : To Sept. 1993
Employer
W.V. COSCOLLUELA AND ASSOCIATES, ARCHITECTS

Position Held and Description of Duties : **Project Architect & Project Coordinator**

Coordinate and inspect quality of works.

Architect-in-charge.

Evaluate additional work/change order.

Job captain for the design and working drawing.

Responsible in the design implementation/construction.

Implement the design of the principal architect in project construction.

Coordinate the progress of the project between owner/client and the contractor.

Head of punchlisting group .

Act as project architect of the assigned task project.

From Jan. 1985 : To July 1989
Employer : D.M. CONSUNJI, INC.
Position Held and Description of Duties : **Junior Architect**

Project-in-charge, finishing phase (L' Ermitage)

Project superintendent, finishing phase (L' Ermitage).

Planning and drafting.

Prepare shop drawing and fabrication drawing.

Prepare preplanning drawing and as-built drawing.

Prepare estimates.

Monitor supervision of wood shop fabrication.

Design reinforce concrete formworks system.

Monitor/coordinate formworks material delivery.

From Jan. 1982 : To Dec. 1984
Employer : FAM CONSTRUCTION AND MANAGEMENT, INC.
Position Held and Description of Duties : **Cadet Architect**

Plan and design of residential houses.

Prepare and monitor daily project status report.

Act as owner representative in project status report.

Prepare estimates.

Prepare additional detail and shop drawing.

Supervise group of construction crew.

11. **Detailed Tasks Assigned** : **Work Undertaken Which Best Illustrates Capability to Handle the Tasks Assigned**

Prepare conceptual architectural designs of airport terminals and other ancillary building.

Jan. 1998 to March 1999
Architect

Prepare architectural designs and drawings for various projects to include:

Nov. 1998 to March 1999 *(4 man-months)*
FERNANDO AIR BASE, *Lipa, Batangas*
Sr. Architect

Master planning and preparation of conceptual designs for existing military airbase which will be converted to General Civil Aviation and Cargo Terminal for BOT proposal.

May 1998 to Nov. 1998 *(6 man-months)*
1910 AIR CONTROL TOWER
Gizan, Saudi Arabia
Sr. Architect

The building provides Air Traffic Control Service to aircraft using the main base runway. The major elements within the tower are emergency generator/battery space, electro-mechanical equipment space and crew lounge with control cab on top.

9256 VEHICLE PARKING SHELTER
Sr. Architect

This structure is a universally applicable shelter for passenger vehicle parking area. The construction and assembly from standard M/S sections lends itself to be done in 2 and 3 bay module which can be extended as required for each site's needs.

The standardized stall for this element will be carried throughout the project so future installation will be possible. The standard parking stall will be 3 x 6 m in plan.

9350 GUARD HOUSE
Gizan, Saudi Arabia
Sr. Architect

This structure is a simple tower with an observation station 8.0 meters above grade. It is designated to work within the architectural guidelines of the project as a whole. The platform provides a sheltered observation post having 360 deg unobstructed view.

9345 GATE/GUARD'S ROOM (GUARDHOUSE)
Sr. Architect

This facility is the control entry point to a brigade, battalion or a specific complex or remote location.

March 1998 to May 1998
FUGA ISLAND RESORT INTERNATIONAL AIRPORT MASTER PLAN
Sr. Architect

Masterplanning of the airport which is identified to have the following facilities:

Airside facilities:

- Runway : 2,500 m. x 60 m. x 18 inches
- Runway Visual Aids and Navaids: Category I lighting system with complete Category I precision apron system
- Telecommunications : For control tower and other aviation facilities. Radar is an option.
- Apron: Area = 45,000 sq.m.

Landside Facilities

- Passenger terminal : capacity = 5,000 passengers daily and capable to handle B-747 traffic
- Approach road and vehicle parking : 14,000 sq.m. for access road and 6,000 sq.m. for parking
- Airfield/Airport Maintenance Building : 400 sq.m. with 100 sq.m. office space, and 300 sq. m. asphalt parking area

- Control Tower : four storeys high
- Crash Fire Rescue Building (CFR): 500 sq.m. fire station
- Cargo Building : 1200 sq.m. fire fabricated metal hangar
- General Utilities : power generation, mechanical, plumbing and drainage, sewage treatment plant.

Jan. 1998 to March 1998 *(3 man-months)*
FUGA ISLAND RESORT INTERNATIONAL AIRPORT PASSENGER TERMINAL
Sr. Architect

The passenger terminal will have a capacity of 5,000 passengers daily and will also be capable of handling B-747 traffic. The terminal will have a total area of 16,000 sq.m. Materials for the terminal will be concrete and steel roof. 20% of the area will be enclosed and air conditioned. Three Baggage Belts of average length 30 to 40 meters will be installed.

GMA NETWROK CENTER PROJECT
June 1997 to Jan. 1998
Project Manager

The project is Phase I of GMA Network Center which involves construction of a new building and site development of the area located at the corner of EDSA and Timog Avenue.

The proposed building consists of two basement parking levels, ten floor levels and a roofdeck with helipad. The two basement levels will accommodate about 72 parking slots per floor while the first three floors will house the various TV stations.

VITARICH PLANT REPLANNING
Marilao, Bulacan
Jan. 1997 to May 1997
Project Manager

This project calls for the development master plan for the 14-hectare Vitarich Plant in Marilao, Bulacan. The complex include a four-storey building that shall accommodate the administration office, personnel training center, laboratory and canteen.

The plant will also be provided with gymnasium, basketball court convertible to multi-purpose hall, workers canteen with 400 person capacity and guard house.

Develop the project quality assurance plan.

Review and approve contract documents (conduct redi-check review)

Prepare, coordinate, evaluate, document and report to the owner all aspects of the project as required by the owner.

Recommend or participate in the selection of the contractor, subcontractors, suppliers, and materials testing laboratory as required by the owner.

Accept or reject quality of workmanship and materials.

UHDE PETROCHEMICAL PLANT PROJECT
Mariveles, Bataan
May 1996 to Dec. 1996
Project Manager

The plant was built by UHDE GMBH, a German equipment, process and system manufacturing/designer, for Petrochemical Corporation of Asia Pacific, the owner. Seven buildings were designed by TCGI: (1) feed safeguard tower (2-storey, 162 sq.m.); (2) Co-catalyst materials storage and unloading (one-storey, 110.5 sq.m.); (3) extrusion building (4-storey, 595 sq.m.); (4) polymerization and analyser house (5-storey, 780 sq.m.); (5) propylene recovery (one-storey, 288 sq.m.); (6) pellet blending and bagging (one-storey, 338 sq.m.); and service platforms.

Attend coordination meeting between owner and contractors.

Assist the owner in the transfer of owner-purchased materials and equipment.

Monitor the contractor's work progress.

NINOY AQUINO INTERNATIONAL AIRPORT – INTERNATIONAL PASSENGER TERMINAL BUILDING – 3 (NAIA – IPT3), *Pasay City*
March 1996 to May 1996 *(3 man-months)*
Sr. Architect

Prepare architectural concept designs in coordination with the expatriate architect for the NAIA – IPT3 for Build Operate Bidding.

ROT STUDY - NINOY AQUINO INTERNATIONAL AIRPORT– INTERNATIONAL PASSENGER TERMINAL – 1, *Pasay City*
Jan. 1996 to March 1996 *(2 man-months)*
Sr. Architect

Prepare architectural schemes to renovate and refurbish the existing terminal building to consolidate domestic and international flight operations of PAL. This is done in coordination with the expat Architect.

PAL NAIA TERMINAL 1
Parañaque, Metro Manila
Oct. 1995 to Dec. 1995 *(3 man-months)*
Sr. Architect

Updating of the Rehabilitation Operation and Transfer (ROT) Proposal for Philippine Airlines International Passenger Terminal on the existing Ninoy Aquino International Airport International Passenger Terminal I (75,000 sq.m.). The study included review and physical inspection of the existing terminal layout and utilities; preparation of architectural conceptual drawings of the refurbished terminal and budgetary cost estimates to construct the project.

Prepare architectural designs and layouts to develop a budget type estimate of necessary renovations (expansion of terminal).

CLARK INTERNATIONAL AIRPORT, *Pampanga*
July 1995 to Oct. 1995 *(3 man-months)*
Sr. Architect

The project involves the Airport and Mixed Land Use Plan for the re-development of the former Clark US Airforce Base. The plan proposes to transform the military complex into a modern world class international airport. The Airport and Mixed Land Use Plan proposes the development plans for Clark Airfield as an international gateway, airport for Metro Manila and the business plan for the Clark Special Economic Zone.

Prepare architectural designs and layouts for the master plan of the project.

MARIWASA CERAMIC PLANT
Sto. Tomas, Batangas
April 1995 to July 1995

The project is a factory envisioned to produce 42,000 sq.m. of wall and floor tiles per day and employ around 450 personnel. Manufacturing requires 5 major processes; body preparation; pressing; drying and bisquefiring; glazing; glost firing; and classifying and packaging. The critical manufacturing process and the accompanying wastes may produce significant environmental effects.

SHINDENGEN SEMI CONDUCTOR PLANT
Carmelray Industrial Park
March 1995 to April 1995

Site development works and construction of a 45m x 105m one-storey fully air-conditioned semi-conductor plant complex complete with support facilities such as plating building, warehouse, office and canteen.

HOLLAND PAPER PLANT
First Cavite Industrial Estate, Dasmariñas
March 1995 to April 1995

Construction of a new plant on a 75,524 sq.m. area. Facilities include: a) one-storey warehouse type building that includes raw materials boiler, in-process warehouse, converting and shipping rooms; (b) one-storey guardhouse; (c) two-storey building that includes spare part store, maintenance shop, tissue machine, de-inking room and machine rooms; (d) two-storey office building; and (e) one-storey power plant building including fuel storage area.

SBMA TRAFFIC MANAGEMENT PROJECT
Olongapo City
Feb. 1995 to March 1995

The project has 3 main components: construction of Rizal Avenue Bridge Subic Diversion Road (3.60 km.) and Kalayaan Security Plaza. The diversion road will provide an alternate route leading to the freeport zone without passing through Olongapo City. The bridge will provide additional access to the freeport and the security plaza will serve as entry to incoming vehicles.

IDPI BOTTLING PLANT
Laguna Technopark, Biñan, Sta. Rosa, Laguna
Feb. 1995 to April 1995

Plant expansion of IDPI consisting of a main building and five support structures; main building for the bottling process, dry and finished goods storage, a 4-storey office building; spirit storage building enclosed by bunk walls, distillery tower, boiler and generator house for power and pressure control; and fuel storage building.

FELS 50MW POWER PLANT
General Santos City
Feb. 1995 to March 1995

Proposed 100MW power plant complex on a 6-ha. lot. The complex includes a power house and substation, a tank farm for fuel storage, a facility building, a one-storey office building, a POL pier with 120-m approximate length to handle fuel delivery, and other amenities such as guardhouses, peripheral fence and gate, exterior lighting, water supply and fire protection system, road network and parking.

H.B. FULLER AND ADHESIVE PLANT
Light Industry Science Park, Cabuyao, Laguna
Oct. 1994 to Jan. 1995

An adhesive plant on a 2,800 sq.m. lot. The facility houses six different product lines with technologies ranging from simple high speed mixing to a controlled

polymerization reaction. The plant requires water treatment facility, spill control and air pollution control equipment.

CALTEX SATELLITE DEPOT
Tanza, Cavite, Sept. 1994 to Feb. 1995

A satellite depot for Caltex, accessible by land and water transportation with layout of proposed facilities (buildings, roads, drainage, fuel tanks, gantry, electrical power station, and pier).

Associate Architect

Act as Senior Designer in assigned project.

Prepare Architectural Concept designs to develop Engineering/Tender drawings.

Coordinate the design with other engineering discipline (structural, sanitary, civil, electrical and mechanical).

Prepare planning and design of proposed projects.

Establish basis of design and design criteria.

Prepare material specification.

Evaluate and approve finishing material submitted by contractor.

Oct. 1993 to Aug. 1994
ST. MICHAEL CONDO, 11 Storey Tower Residential Flat Bldg. and a 4 Storey Podium Shops/Offices Bldg., *Jalan Taman and Serangoon Road, Singapore*

PANDAN LOOP FACTORY, 3 Blocks of 7 Storey Related Factory Bldg., *Pandan Loop Road, Singapore*

JALAN JURONG KECHIL CLUSTER BLDG., proposed 8 and 10 Storey Bldgs. Singapore

BALESTIER COMMERCIAL BLDG., 10 Storey Bldg. Comprising Shops, Offices and Residential Flats, *Balestier Road/Shan Road, Singapore*

JALAN TAMAN CONDO, Proposed Erection of a Block of 12 Storey Flats Residential Condominium, *Jalan/Serangoon Road, Singapore*

Architect

Preparation of design documents.

Evaluate schematic design.

Prepare planning and design of proposed assigned projects.

Prepare tender drawing, building permit drawing and planning permit drawing.

Aug. 1989 to Sept. 1993
SKYLAND PLAZA CONDOMINIUM
Buendia, Makati

TUTUBAN CENTER BUILDING
Tondo, Manila

KARINA OFFICE BUILDING
Pasig

PLDT GARNET BUILDING
Pasig

FUJI XEROX BUILDING
South Superhighway

Project Coordinator/Project Architect

Coordinate and inspect quality of works.

Architect-in-charge.

Evaluate additional work/change order.

Job captain for the design and working drawing.

Responsible in the design implementation/construction.

Implement the design of the principal architect in project construction.

Coordinate the progress of the project between owner/client and the contractor.

Head of punchlisting group .

Act as project architect of the assigned task project.

Jan. 1985 to July 1989
DMC FISHPOND MULTIPURPOSE HALL
Bataan, Jan. 1985 to Feb. 1985

SIRAWAN FRUIT PROCESSING PLANT
Cotabato, Feb. 1985 to March 1985

MWSS PG-7A
EDSA to Roxas Blvd.,
March 1985 - Jan. 1986

MWSS PG-7D
Roxas Blvd. to Airport Road
Feb. 1986 - June 1986

MWSS SD-13
Sucat Road to Marcelo Subvd.
June 1986 to Dec. 1986

JORGE A. CONSUNJI RESIDENCE
Magallanes Village, Jan. 1987 to March 1987

U.P.D.I. CONDOMINIUM
Pandacan, April 1987 to June 1987

UP ENGINEERING LIBRARY EXTENSION
Diliman, July 1987 to Aug. 1987

CITYLAND CONDOMINIUM 5
South Superhighway, Sept. 1987 to Dec. 1987

CALTEX CONDOMINIUM
San Pascual, Batangas, Jan. 1988 to Feb. 1988

L'ERMITAGE APARTMENT BUILDING
Salcedo Village, Makati City
March 1989 to July 1989

Junior Architect

Project-in-charge, finishing phase (L' Ermitage)

Project superintendent, finishing phase (L' Ermitage).

Planning and drafting.

Prepare shop drawing and fabrication drawing.

Prepare preplanning drawing and as-built drawing.

Prepare estimates.

Monitor supervision of wood shop fabrication.

Design reinforce concrete formworks system.

Monitor/coordinate formworks material delivery.

Jan. 1982 to Dec. 1984
MR. & MRS. LEANDRO RAMOS RESIDENCE
Aug. 1984 to Dec. 1984

DR. & MRS. FIDEL MENDOZA, Two Storey Residence
March 1984 to Aug. 1984

MR. & MRS. GREGORIO FELICIANO APARTMENT
July 1983 to March 1984

MR. & MRS. RAMON ANUNAS RESIDENCE
Feb. 1983 to July 1983

ENGR. & MRS. FRUTACIO MIDEL RESIDENCE
Sept. 1982 to Jan. 1983

MR. & MRS. RODOLFO MOJICA RESIDENCE
Jan. 1982 to Aug. 1982

Cadet Architect

Plan and design of residential houses.

Prepare and monitor daily project status report.

Act as owner representative in project status report.

Prepare estimates.

Prepare additional detail and shop drawing.

Supervise group of construction crew.

12. **Certification** :

I, the undersigned, certify to the best of my knowledge and belief, that the information in this biodata are true and correctly describes myself, my qualifications and my experiences. I understand that any willfull misstatement described herein may lead to my disqualification or dismissal, if employed or renders me liable for criminal prosecution.

Moreover, I certify that I am a full time / part time employee of TCGI Engineers and I have been employed by the firm for the last 5 years.

SIGNATURE :

DATE OF SIGNING : / /
Day Month Year

1.	**Proposed Position**	:	Sanitary Engineer
2.	**Name**	:	ARTURO A. BRUCE
3.	**Date of Birth**	:	29 July 1950
4.	**Nationality**	:	Filipino
5.	**Education**	:	Master of Science in Environmental Studies Miriam College, 1994, 9 units earned Bachelor of Science in Sanitary/Environmental Engineering National University, 1977 Bachelor of Science in Civil Engineering National University, 1975 Registered Sanitary Engineer, 1977
6.	**Professioual Organizations:**		Philippine Water Works Association Philippine Society of Sanitary Engineers
7.	**Languages & Degree of Proficiency**	:	English - Excellent Filipino - Excellent
8.	**Countries of Work Experience**	:	Philippines
9.	**Years with Firm** :	1 year	
10.	**Employment Record**		
	From Oct. 1998	:	To Present
	Employer	:	TCGI ENGINEERS
	Position Held and Description	:	LIMA RESIDENTIAL ESTATE Sr. Sanitary/Water Supply Engineer The Lima Residential Project involves the development of 57 hectares of agricultural land into a residential estate which will cater to the housing needs of the upper and middle class employees of the adjacent Lime Technology Center Industrial Estate and fast expanding population of the CALABARZON. It is located West of the Lima Technology center industrial estate in the town of Malvar, Batangas, about 80 km. from Manila via South Expressway. Responsible for the preparation of conceptual design and detailed design drawings and documents for water supply and sewerage system.

TIWI GEOTHERMAL PROJECT, UNIT 1 AND 2 (330 MW), *Tiwi, Camarines Norte*

BATAAN THERMAL PLANT NOS. 1 AND 2 (225 MW), *Limay Bataan*

LIGAO DIESEL PROJECT (0.3 MW)
Ligao, Albay

Geologist

Responsible for the site selection and supervise investigation works. Make foundation appraisals and prepare engineering-geological report for design purposes.

From 1960 : To 1968
Employer : NATIONAL POWER CORPORATION
Position Held :
Project Description/ Duties :

ANGAT RIVER HYDRO-ELECTRICAL PROJECT (NPC - 218 MW)
Norzagaray, Bulacan
Geologist

During the investigation stage, supervise geological mapping, plane table surveys and subsurface exploration activities (drilling, test pitting and trenching).

Prepare geological maps, logs of borings and test pits and compilation of drilling results and specifications for grouting to form as enclosures in the feasibility and detailed design reports.

Assigned as Resident Geologist and supervise all geological and drilling activities which include surface and subsurface mapping of all underground excavation to determine tunnelling, support methods and drilling, grouting of holes for foundation treatment. Recommend additional grout holes at the damsite, powerhouse and along tunnels. Assess and evaluate overbreaks in surface and subsurface excavations, whether they are payable or not based on joint pattern, rock conditions and drilling and blasting methods applied. Supervise work force of six geologists and five mechanical engineers.

Conduct post construction studies which include monitoring of seepages, erosion of reservoir slopes, settlement of dam and dike embankments and slopes.

Prepare drilling program for drainage of the rock slope east of the upstream wall of the main powerhouse, drilling and grouting programs to eliminate foundation seepage downstream of the main dike.

From 1959
Employer : NATIONAL POWER CORPORATION
Position Held :
Project Description/ Duties :

CANLUBANG MINI-HYDRO PROJECT
Canlubang, Laguna
Geotechnical Engineer

OTHER MINI-HYDRO PROJECTS
Various Locations, Leyte and Samar Provinces
Consulting Engineering Geologist

Conduct reconnaissance surveys at the damsite and reservoirs.

From 1958
Employer : NATIONAL POWER CORPORATION
Position Held :
Project Description/ Duties :

TONOK MINI-HYDRO PROJECT
Gandara, Samar
Consulting Engineering Geologist and Geotechnical Engineer

Responsible for the programming of surface and subsurface investigation works of various engineering structures. Make joint surveys and foundation appraisal for design purposes.

From 1957 : To 1976
Employer : NATIONAL POWER CORPORATION
Position Held :
Project Description/ Duties :

AGUS NOS. 1, 2, 3, 4, 5, 6 AND 7 HYDRO-ELECTRIC PROJECTS (NPC - TOTAL, 970 MW),
Various Locations, Lanao Province
Jr. Geologist

Provide detailed geological mapping at the damsites and related sites structures. Log all drillhole cores of Agus Nos. 1, 2, 6 and 7 to form enclosures for bid documents.

From 1957 : To 1960
Employer : NATIONAL POWER CORPORATION
Position Held :
Project Description/ Duties :

MARIKINA MULTI-PURPOSE PROJECT (NPC - 68.6 MW), *San Mateo, Rizal*
Geologist

Conduct detailed investigation at the damsite and along tunnel lines by plane table survey. Delineate solution cavities. Log test pits, boreholes and exploratory audits. Assist the Geologist in the preparation of geological drawings and logs.

BINGA HYDRO-ELECTRIC PROJECT (NPC - 100 MW), *Benguet, Mt. Province*
Jr. Geologist

Assist Resident Geologist in the office and field geological

activities on surface and underground workings.

NOBEL PHILIPPINES, INC. PROJECT
Dumaguete, Negros Oriental
Consulting Engineering Geologist/Hydrogeologist

Locate sources of water supply and program site investigation works for nitrate plant and pier.

AGUS NO. 2 HYDRO-ELECTRIC PROJECT
Sagtaran Lanao del Sur

OLONGAPO SUBSTATION
Olongapo, Zambales

AGUS NO. 6 HYDRO-ELECTRIC HOUSING COMPOUND PROJECT
Iligan City, Lanao del Norte

BATAAN NOS. 1 AND 2 THERMAL PROJECTS, *Limay, Bataan*

LIGAO DIESEL PROJECT
Ligao, Albay
Geologist, NPC

Locate and supervise drilling of wells, log drill cuttings for well design. Interpret pumping tests results for sizing of pumps and setting depths.

From Oct. 1957 : To Nov. 1957
Employer : ATLAS CONSOLIDATED MINING AND DEVELOPMENT CORPORATION PLANT

Position Held :
Project Description/ :
Duties :

MATLING MINI-HYDRO PROJECT
Malabang, Cotabato
Consulting Engineering Geologist and Geotechnical Engineer

Provide foundation appraisal at the sites of the powerhouse and penstock (thrust block section). Determine level of competent materials suitable for foundation.

CAMOTES ISLAND DIESEL PROJECT
Camotes Island, Cebu
Consulting Engineering Geologist

Relocate plant site after surface and subsurface investigations due to geological defects.

ATLAS CONSOLIDATED MINING AND DEVELOPMENT CORPORATION PROJECT
Toledo, Cebu
Mining Engineer

Assist the Shift Mining Engineer in the supervision of mining activities in the pit which include preparation of

blast hole pattern on benches, drilling, and blast hole loading. Supervise loading and hauling of ore from the pit to the mill plant crusher.

Prepare daily shift report on drilling footages, operating and downtime of mine equipment, dynamite consumptions (including misfires) and blasting accessories.

Assist the Jigger Boss in the supervision of activities in the mine pit. Compute and record blast hole charges and record drilling and accomplishments. Determine equipment operating and downtime.

CARAMOAN DENDRO THERMAL PROJECT
Caramoan, Camarines Sur

MASELCO DENDRO THERMAL PROJECT
Mobo, Masbate

Consulting Engineering Geologist and Geotechnical Engineer

Conduct detailed joint survey and review borehole logs to determine sound and stable foundation for the propose powerhouse and cableway structures. Investigate sources of construction materials and gather samples for laboratory testing results used for design purposes.

CEBU NO. 2 DIESEL PROJECT (57.8 MW)
Naga, Cebu

BOHOL NO. 1 DIESEL PROJECT (11 MW)
Tagbilaran, Bohol

AMLAN DIESEL PROJECT (11 MW)
Amlan, Negros Oriental

PANAY DIESEL PROJECT (35.5 MW)
Dingle, Iloilo

SIPALAY DIESEL PROJECT (72 MW)
Sipalay, Negros Oriental

JASAAN DIESEL PROJECT (126.7 MW)
Villanueva, Misamis Oriental

CEBU NO. 1 THERMAL PROJECT
Naga, Cebu

MAKILING-BANAHAW GEOTHERMAL PROJECT UNITS 1 AND 2 (660 MW)
Los Baños, Laguna

Supervising Geologist

Responsible for the location sites for the plant, sources of water supply and construction materials. Supervise

investigation works, include drilling, rock and soil sampling for laboratory analysis and load tests for foundation appraisal. Interpret results of pumping tests for the sizing of pumps including water sampling for quality control use in boilers.

Write evaluation reports for enclosure in the feasibility and detailed design reports.

PASAR PORT AND FACILITIES
Isabela, Leyte
Consulting Engineering Geologist and Geological Engineer

Responsible in the programming and supervision of detailed geological mapping and subsurface exploration. Work closely with civil engineers in the interpretation of engineering-geological data for design use in both feasibility and detailed design studies.

DAVAO UNION CEMENT CORPORATION PORT PROJECT
Ilang, Davao City
Consulting Engineering Geologist and Geotechnical Engineer

Program surface and subsurface investigation works (detailed geological mapping and core drilling) including supervision. Evaluate engineering-geological data and laboratory test results for design purposes.

BACNOTAN CEMENT INDUSTRIES, INC. PROJECT, *Luna, La Union*
Consulting Engineering Geologist

Conduct detailed site geological mapping and program core drilling exploration.

Investigation of underground seepage causes at the plant site. Prepare investigation programs including supervision. Evaluate investigation data gathered obtained to be used by civil design engineers.

MACTAN INTERNATIONAL AIRPORT PROJECT,
Mactan, Cebu
Consulting Engineering Geologist

Program and supervise investigation works along the existing and alternative runway alignments.

PASAR RUNWAY PROJECT
Isabel, Leyte
Consulting Engineering Geologist

Reconnaissance investigation of the Sierra Madre tower foundation and immediate vicinity.

Conduct detailed surface investigation at the Zambales tower site.

DAVAO UNION CEMENT CORPORATIOIN PROJECT, *Ilang, Davao City*
Consulting Engineering Geologist

Program and supervise surface and subsurface investigation programs which include geological mapping, core drilling and laboratory testing. Work with civil engineers in data interpretation for design purposes.

PHILIPPINE LONG DISTANCE TELEPHONE SPORTS COMPLEX, *Mandaluyong, Metro Manila*
Consulting Engineering Geologist and Geotechnical Engineer

Responsible in the programming and supervision of detailed geological mapping, core drilling and sampling for laboratory testing. Interpret geological, drilling and laboratory tests results for design purposes. Write evaluation report for the detailed design stage.

ANGAT WATER SUPPLY OPTIMIZATION PROJECT (MWSS), *Bulacan Province and Quezon City*
Consulting Engineering Geologist and Geotechnical Engineer

Program and supervise investigation works (geological mapping, core drilling and test pitting) at the sites of various engineering structures (7-km tunnel, outlet basins, 17-km aqueduct and treatment plant) and potential sources of construction materials. Conduct investigations on alternative scheme (by pumping) at the sites for the dam and water conveyance structures.

Work closely with civil engineers, evaluate geological, drilling and laboratory test results and make foundation appraisals for design purposes. Prepare engineering-geological reports.

Meet with ADB Consultants and implement special additional works, e.g. gathering of soil and rock samples for laboratory testing to determining tunnel supports and obtain parameters for the design of tunnel boring machine.

Attend pre-bid conference with prospective Contractors and answer geological and geotechnical questions. Prepare drawings and addenda forming part of the construction drawings.

MEDINA COCONUT PRODUCTS PROJECT
Medina, Misamis Oriental
Consulting Engineering Geologist

Conduct investigation at sites for existing water supply

sources from underground reservoir (deepwells). Determine cause of water pollution and recommended remedial measures.

SAN ROQUE HYDRO-ELECTRIC PROJECT (NPC - 390 MW), *San Manuel, Pangasinan*
Consulting Engineering Geologist/Hydrogeologist

Conduct investigation of possible water supply sources from underground reservoirs and rivers. Program investigations works for both sources.

BARANGAY WATERWORKS PROGRAM
Various Locations
Consulting Engineering Geologist and Hydrogeologist

Conduct investigations at existing sites and prepare work programs for potential sites which include detailed geological mapping, resistivity survey and test well drilling for underground reservoirs; mapping, core drilling and test pitting for surface water from dams.

CENTRAL CEMENT CORPORATION PROJECT, *San Ildefonso, Bulacan*

Review deepwell operations and pump discharges, logs of wells and pumping tests results including well rehabilitations to determine whether additional wells can still be drilled between existing wells to augment present capacities.

Study the possibility of enlarging their present man-made pond for storing additional water from rains. Make recommendation on clay blanketting of unlined ponds to eliminate/minimize seepage substantially.

From July 1957 : To Oct. 1957
Employer : ATLAS CONSOLIDATED MINING AND DEVELOPMENT CORPORATION

Position Held :
Project Description/ Duties : Junior Mining Engineer

12. **Certification** :

I, the undersigned, certify that, to the best of my knowledge and belief, that the information in this biodata are true and correctly describes myself, my qualifications and my experiences. I understand that any willful mis-statement described herein may lead to my disqualification or dismissal, if employed or renders me liable for criminal prosecution

Moreover, I certify that I am a full time employee of TCGI ENGINEERS and I have been employed by the firm for the last 9 years & 5 months.

SIGNATURE :

DATE OF SIGNING :
Day / Month / Year

Cvdp cv's

1.	**Proposed Position**	:	**Drainage Engineer/Hydrologist**
2.	**Name**	:	**EUGENIA M. LUZTRE**
3.	**Date of Birth**	:	6 October 1962
4.	**Nationality**	:	Filipino
5.	**Education**	:	B.S. in Civil Engineering University of the East Manila, 1984 B.S. in Sanitary Engineering National University Manila, 1991 Registered Civil Engineer, No. 52204
6.	**Professional Training**	:	Public Health and Environmental Sanitation, National University, February 2, 1991 Environmental Impact Analysis, National University, Manila, October 6, 1990 EDF Fundamentals with Wordstar, De La Salle University, Impact Center, February to March 1989 Logic Formulation Course, De La Salle University, Impact Center, April to June 1989 Seminar on PERT/CPM (Project Evaluation Review Techniques/Critical Path Method), October 24-25, 1987
7.	**Languages**	:	English – Fluent Filipino – Fluent
8.	**Countries of Work Experience**	:	Philippines
9.	**Years with Firm**	:	2 years & 5 months
10.	**Employment Record**		
	From June 1998	:	To Present
	Employer	:	TCGI ENGINEERS
	Position Held and Description of Duties	:	**CENTRAL VISAYAS AIRPORTS** *Bais City and Panglao, Bohol* Feb. 2000 to Nov. 2000 **Hydraulic Engineer/Drainage Engineer** The Bais City Airport is to be developed into an International Airport in two phases. The runway extends 2,500 m under Phase I and an additional 500 m. in Phase II. Operation of Airbus (A300) is expected by 2020. The new airport shall be equipped with all weather and 24-hour operation, shall be provided with passenger and cargo terminal buildings as well as air traffic control tower and air rescue and fire fighting station. Airport development layout shall involve 250 ha. The Panglao Airport is also to be developed into an International Airport with

3,000 m. runway, equipped with an all weather and 24-hour operation, shall be provided with passenger and cargo terminal buildings, air traffic control tower and air rescue and fire fighting station. Operation of airbus (A300) is expected and the airport development layout shall involve 280 ha.

Prepare hydrology report necessary for the design of drainage structures. Conduct study on hydraulic structures and prepare preliminary designs of all drainage structures for the above airport projects.

KAWAYAN COVE PROJECT
Nasugbu, Batangas
Sept.1999 to Jan. 2000
Sr. Hydrologist/Drainage Engineer

Site development including roadways, drainage, water supply, electrical and site grading. Prepare hydrology report necessary for the design of drainage and other structures for the site development project. Make hydrology and hydraulic calculations of all drainage structure of the project. Prepare quantity take-off of all drainage structures of the project.

LAS TERRAZAS SUBDIVISION PROJECT
Davao City
May 1999 to Sept. 1999
Sr. Hydrologist/Drainage Engineer

The Project is to be developed into a high quality sustainable residential estate, which concerns for quality, comfort and well being of residents. It is located in Barangay Langub about 4 kms. from the center of Davao City. Prepare hydrology report necessary for the design of drainage and other structures for the site development project. Make hydrology and hydraulic calculations of all drainage structure of the project. Prepare quantity take-off of all drainage structures of the project.

PSI TECHNOLOGIES PLANT PROJECT
Sto. Tomas, Batangas
Dec. 1998 to May 1999
Hydrologist/Drainage Engineer

The plant complex will be constructed in 3.5 hectare lot within the Philtown Estate in Sto. Tomas, Batangas. The complex will consist mainly of the following facilities:

- One-storey fully air –conditioned manufacturing building (with provision for a second floor) with a total ground floor area of approximately 12,710 sm.
- Two-storey, fully air-conditioned office and personnel services building with a total area of approximately 5,516 sm. including a transit facility with loading docks to accommodate finished goods, components and other warehousing requirements of the plant.
- One-storey peripheral utility building, approximately 1,300 sm. to accommodate the plant's electro-mechanical support utilities

Prepare hydrology report necessary for the design of drainage and other structures for the site development project. Make hydrology and hydraulic calculations of all drainage structure of the project. Prepare quantity take-off of all drainage structures of the project.

VISTA DE BAY DEVELOPMENT PROJECT
Calamba, Laguna
June 1998 to Present
Sr. Drainage Engineer/Hydrologist

The project refers to a 150 – ha. property to be developed into a high and medium-high residential subdivision. It consists of two hills masterplanned such that future homeowners will have vantage view of Laguna de Bay, Mount Makiling and the Metro Manila area.

The project owners envisioned the Subdivision to be environment-friendly, that is, road design and site grading conform closely with the existing topography. Some areas are allocated as view corridors, to be planted with trees and shrubs. The water reservoir will be built on-grade, with the hill's summit. Cables for utilities will be laid underground – for power, telephone and CATV. A spine road connecting the two hills will provide access to the site.

Prepare hydrology report necessary for the design of drainage and other structures for the site development project.

Make hydrology and hydraulic calculations of all drainage structure of the project.

Prepare quantity take-off of all drainage structures of the project.

From Aug. 1995 : To May 1998
Employer : KTA TENAGA SDN. BHD
Kuala Lumpur Malaysia

Position Held and Description of Duties :

KARAMBUNAI DALIT ROAD

PSR-2 MELAKA OIL & GAS REFINERY PROJECT

1 ½ BAY MAS HANGAR-04/WORKSHOP COMPLEX FOR SULTAN SALLAHUDDIN ABDUL AZIZ SHAH INTERNATIONAL AIRPORT IN SUBANG

EXPRESS RAIL LINK PROJECT FROM KUALA LUMPUR CENTRAL STATION TO KUALA LUMPUR INTERNATIONAL AIRPORT IN SEPANG

Civil/Drainage Engineer

Prepare design computation of underground drainage system of PSR-2 Melaka Oil & Gas Refinery Project.

Prepare hydrology and hydraulic calculations of all drainage structures of various projects.

Prepare quantity take-off of all drainage structures.

Conduct hydrologic studies involving the determination of drainage area and other hydrologic parameters.

From Sept. 1994 : To Aug. 1995
Employer : TRANS-ASIA PHILIPPINES
Position Held and
Description of Duties :

CALAMBA MASS HOUSING PROJECT

STATELAND ROLLING HILLS SUBDIVISION

REPUBLIC CEMENT EXPANSION PROJECT

PARK VIEW HOMES SUBDIVISION

TAGAYTAY COUNTRY HOMES

Civil/Drainage Engineer

Prepare design analysis and computation of drainage system of the projects.

Prepare cost analysis and quantity calculations.

Assist in the preparation of site development plan.

Conduct hydrologic studies involving the determination of drainage area and other hydrologic parameters. Conduct rainfall studies and determine discharges using Rational Method.

June 1994 to Oct. 1994
LOCAL GOVERNMENT INFRASTRUCTURE PROJECT
- **Kapatagan Public Market**
- **Tubod Public Market**

REGATTA MASS HOUSING PROJECT (ROWHOUSE, DUPLEX, MULTI-PURPOSE HALL, GUARD HOUSE)

Civil/Drainage Engineer

Prepare design analysis and computation of drainage system of Kapatagan and Tubod Public Market

Preparation of plumbing layout of Row House, Duplex and Multi-Purpose Hall of Regatta Mass Housing Project.

Prepare quantity take-off of all drainage structures of the project.

Conduct hydrologic studies involving the determination of drainage area and other hydrologic parameters. Conduct rainfall studies and determine discharges using Rational Method.

Jan. 1994 to April 1994
FEASIBILITY STUDY OF METRO MANILA TOLLWAY & SKYWAY PROJECTS
Civil/Drainage Engineer

Data gathering and ocular inspection of the project site.
Make an inventory of all drainage structures of the existing section of the project.

Research and evaluation of all hydro-metereological data and preparation of rainfall intensity chart.

Estimate flood discharge and culvert capacity, computation of maximum discharge of rivers and determination of maximum flood level (MFL) for bridge sites including depth of scour.

Computation of drainage area, length of longest water course and time of concentration.

Conduct hydrologic studies involving the determination of drainage area and other hydrologic parameters. Conduct rainfall studies and determine discharges using Unit Hydrograph Method.

From June 1988 : To Oct. 1994
Employer : FILIPINAS DRAVO CORPORATION
Position Held and :
Description of Duties :

Mar. 1993 to Dec. 1993
FEASIBILITY STUDY OF ALTERNATE ARTERIAL ROADS FOR CENTRAL LUZON
- **San Fernando – Dinalupihan Section**
- **Tarlac – Iba Road**
- **New North Luzon Expressway**

Civil/Drainage Engineer

Data gathering and ocular inspection of the project site.

Make an inventory of all drainage structures of the existing section of the project.

Research and evaluation of all hydro-metereological data, analysis of rainfall data and preparation of rainfall intensity chart.

Estimate flood discharge and culvert capacity, computation of maximum discharge of rivers and determination of maximum flood level (MFL) for bridge sites.

Nov. 1992 to Mar. 1993
61 HECTARES MT. PINATUBO VICTIMS RESETTLEMENT PROJECT, *Mexico, Pampanga*

RESTORATION OF CEBU NORTH ROAD PROJECT

Field Inspector/Civil/Drainage Engineer

Detailed design of the drainage system of the 61-hectare Mt. Pinatubo Victims Resettlement Area located at Mexico, Pampanga.

Construction supervision of drainage and water system of the project.

Undertake design of all drainage structures of Cebu North Road Project.

Prepare quantity take-off of all the drainage structures of the project.

May 1991 to Nov. 1992
DETAILED ENGINEERING DESIGN OF ADB LUZON PROJECT, PACKAGE "E"

ROSARIO – PUGO ROAD, *La Union*

TAGUDIN-CERVANTES-MANKAYAN ROAD, *Ilocos Norte*

Civil/Drainage Engineer

Review and evaluate existing and related studies of previously undertaken for the project.

Inventory of existing drainage structures along proposed road alignment.

Design computation of roadway drainage structures as to the adequacy of existing and proposed culverts/structures.

Estimate of flood discharge and culvert capacity, design of bridge opening highway culverts, roadside drainage channels and other road drainage appurtenances.

Determine catchment areas with the aid of aerial photos and military maps.

Preparation of hydrology report to be submitted to DPWH.

Design appropriate reinforced concrete pipe and box culverts to be used in draining the flood water that will intercept the project road.

Jan. 1990 to April 1991
DETAILED ENGINEERING DESIGN OF ADB LUZON PROJECT PACKAGE "A" -LUCBAN-TAYABAS ROAD AND FAMY-INFANTA ROAD
Civil/Drainage Engineer

Review and evaluate existing and related studies previously undertaken for the project.

Inventory of existing drainage structures along proposed culverts/structures.

Prepare design calculation for roadway drainage structures as to the adequacy of existing and proposed culverts/structures.

Estimation of flood discharge and culvert capacity, design of bridge opening, highway culverts, roadside drainage channels and other road drainage appurtenances.

Determination of catchment areas with the aid of aerial and military maps.

Designs appropriate reinforced concrete pipe and box culverts to be used in draining the flood water that will intercept the project.

June 1988 to Jan. 1990
DETAILED ENGINEERING DESIGN FOR THE LUZON TOLLWAY EXTENSION PROJECT
Sto. Tomas-Lucena Section

DETAILED ENGINEERING FOR NORTH LUZON TOLLWAY EXTENSION
Tarlac-Carmen Section

DETAILED ENGINEERING DESIGN FOR STA. ROSA INTERCHANGE PROJECT

Civil/Drainage Engineer

Data gathering and ocular inspection of the project site.

Analysis of rainfall data and preparation of rainfall intensity chart. Perform hydrologic calculations.

Delineation of catchment areas by planimeter and corresponding parameters.

Design computation for roadway drainage structures as to the adequacy of existing and proposed culverts/structures.

Drainage design computation and analysis of nine interchanges and several overpasses and farm crossings.

Estimation of flood discharge and culvert capacity, design of bridge opening, highway culverts, roadside drainage channels and other road drainage appurtenances.

Computation of maximum discharge of rivers and determination of maximum flood level (MFL) for bridges sites including depth of scour.

Quantity take-off of highway drainage structures.

Coordination with draftsmen with regards to the plotting of drainage structures on plan and profile, drafting of drainage schedule and vertical ditches, junction boxes and other hillside structures.

From Feb. 1985 : To April 1988
Employer : GARCIA CONSTRUCTION COMPANY
Position Held and Description of Duties : **VARIOUS HOUSING PROJECTS**
Junior Engineer/Estimator

Study the plans and specifications for estimates.

Conduct material quantity take-off from the plans.

Evaluate quotations from different suppliers/contractors and present them to the Chief Estimator.

11. Certification :

I, the undersigned, certify to the best of my knowledge and belief, that the information in this biodata are true and correctly describes myself, my qualifications and my experiences. I understand that any willfull misstatement described herein may lead to my disqualification or dismissal, if employed or renders me liable for criminal prosecution.

Moreover, I certify that I am a full time / part time employee of TCGI Engineers and I have been employed by the firm for two years and 5 months.

SIGNATURE :

DATE OF SIGNING : / /
Day Month Year

1.	**Proposed Position**	:	Sociologist
2.	**Name**	:	MARIA LINA A. DIONA
3.	**Date of Birth**	:	February 23, 1955
4.	**Nationality**	:	Filipino
5.	**Education**	:	A.B. Economics, 1981 Rizal Technological Colleges A.B. Mass Communications, 1975 Far Eastern University
6.	**Professional Training**	:	Seminar-Convention on Aqua-Tech Asia '96, The International Exhibition on Water Technology, 24-26 June 1996, Singapore International Convention and Exhibition Centre, Singapore Seminar-Workshop on MWSS Operational Strengthening Study, MWSS Seminar Hall, HRDD, MWSS Main Office, Balara, Q.C., January 1996 Seminar-Workshop on Feasibility Studies of Road Projects, Communications Foundations for Asia, Sta. Mesa, Manila, December 17-18, 1993. Orientation-Training for Macintosh Computers, NCP Bldg., Villamor Interchange, South Superhighway, Makati City, January 23-27, 1995. Training and Strategic Planning Workshop on Municipal Integrated Nutrition Program, Vigan, Ilocos Sur, March 27-30, 1995. Micro Computer Training - TCGI Engineers, Legaspi St., Legaspi Village, Makati Investment Consultant Training on Commodity Futures Trading, Kingly Commodities Traders and Multi-Resources, Inc. Vernida IV Bldg., Salcedo Village, Makati, January 27-Feb. 6, 1988. Basic Supervisory Development Course NMYC-World Bank/SEA-BMB Consultants, Inc., Sept. 7-18, 1987. Seminar on National and Regional Income Accounting sponsored by NEDA Seminar on Project Evaluation sponsored by the Philippine Investments Systems Organizations. Microcomputer Training Phil. Ports Authority/Lavalin International, February - May 1984 Cobol Programming, April-June 1982, Phil. Advanced Studies & Seminars, Inc., Rufino Bldg., Ayala Ave., Makati, Metro Manila DP Fundamentals & Basic Programming, Sept. - Dec. 1981, National Computer Center, Camp Aguinaldo, Quezon City Financial Management & Project Evaluation - March 1980,

Ministry of Natural Resources & Development Academy of the Phils. Tagaytay City

Project Management & Monitoring, January 1980, Ministry of Natural Resources & DAP, Tagaytay City.

Other Skills :

Micro Computers PC-DOS (Word Perfect 5.1, Lotus 123, and Apple Mackintosh. Microsoftword, Excel, Mc Draw)

Typewriters-electric and manual (50 wpm)

Other Machines - facsimile, xerox

7. **Languages** : English - Excellent
Filipino - Excellent

8. **Years with the Firm** : 9 years

9. **Country of Work Experience** : Philippines

10. **Employment Record**

From March 1997 : To Jan. 1999 (18 man-months)
Employer : TCGI ENGINEERS
Position Held :
Project Description/ Duties : VARIOUS TCGI PROJECTS
Sociologist

Determine the socio-economic profile of resident population within the study area of the projects.

Conduct field visits and organize related surveys.

Investigate and assess the project as to its effect on economy and the public as well.

Projects Undertaken:

LIMA TECHNOLOGY CENTER PROJECT
AREA COMMERCIAL B

The Lima Technology Center (LTC) Project Area Commercial B is located southwest of the LTC industrial estate. It involves the development of about 60 hectares of agricultural land into an area for commercial, leisure and service industry development. Infrastructures including water, power, telecommunications and waste disposal will be designed to meet the highest international standards. Its design philosophy which is focused on a working environment that is not only state of the art but also people-friendly will set it above and apart from some of the most advanced industrial estates in Asia.

MONTE REAL PROJECT
The Monte Real Project is to be developed into a high quality sustainable residential estate, which concerns for quality, comfort

and well being of residents. It is located in Barangay Langub about 4 kms. from the center of Davao City.

AVON MANUFACTURING PLANT

The project is a manufacturing plant on a 7-ha lot consisting of a 7,800 sq.m. manufacturing building, 2,800 sq.m. 2-storey office building, 9,600 sq.m. warehouse facility, complete with support utilities such as steam generator, compressed air, raw and processed water (DI and Chilled), waste treatment, etc. Amenities for the project include basketball and tennis courts and a covered area for indoor games.

From Sept. 1996 : To Feb. 1997 (6 man-months)
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : MWSS PRIVATIZATION PROJECT
Duties : Sociologist

Determine the socio-economic profile of the resident population by city/municipality.

Derivation of potential per capita consumption rates by consideration of living standards.

Overview and comment on level of connectivity of domestic consumers.

Analyze and advice on the ability and willingness to pay for water and sewage services.

Investigate historic anomalies.

Establish land areas occupied by the commercial and industrial consumers previously studied by Binnie Thames.

From June 1996 : To Sept. 1996 (4 man-months)
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : LIMA INDUSTRIAL ESTATE PROJECT
Duties : Sociologist

Organize team to conduct interviews with the beneficiaries and local officials of the project study. Collect data and information relevant to the study.

Determine the economic status of the project by checking on the revenue versus expenditure of the municipalities covered which will prove adequate for operation and maintenance. It should provide a reasonable return to the project which is generally considered to be at least equal or the opportunity cost of capital.

Investigate and assess of the project as to its effect on economy and public as well.

From May 1996 : (1 man-month)
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : **FEASIBILITY STUDY REPORT ENVIRONMENTAL MARKET DEMAND ANALYSIS-WOODWARD-CLYDE PHILIPPINES, INC.**. *Greenhills, San Juan, Metro Manila*
Duties : **Editor**

As, editor, did editorial services for the Final Report of the Environmental Market Demand Analysis complying with the ADB report format.

From Aug. 1995 : To March 1996 (8 man-months)
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : **MWSS OPERATIONAL STRENGTHENING STUDY**
Duties : **Sociologist/Research Associate**

Draw up research design in consultation with the Project Manager. Execute the research activities of the project according to schedule. Submit to the clients, progress and final reports on data.

With regard to the administrative procedure, the following are the obligations:

- o Recommend project staff (research assistants) according to the company's employment system and coordinate with the Project Manager on the selection of the said staff.
- o Supervise the working hours of the project staff.
- o Supervise the work load of the research assistants. Plans ahead of time the need for the assistant's services. Under these, performed the following duties:
  - a. Schedule interviews
  - b. Drew samples for all types of interviews
  - c. Supervise and edit weekly interviews
  - d. Monitor interview techniques
  - e. Offer remedial training in some cases
  - f. Supervise daily preparation of team diary
  - g. Mediate personal problem among subordinates
- o Control projects disbursements and expenses.
- o Coordinate for help regarding fieldwork, data processing and analysis and publication matters.
- o Submit in writing the finality of the services of the socio-economic survey, research and report in connection with the projects involved in.
- o Undertake the same services defined as the situation obtaining the project demands even after the full professional services has already been accepted by the Client.
- o Perform ocular visits to the research sites and make the

necessary organizations of the plans for the project implementation.

From July 1994 : To Aug. 1994 (2 man-months)
Employer : ASIAN DEVELOPMENT BANK
Position Held :
Project Description/ : **POST EVALUATION STUDY, ADB ASSISTED**
Duties : **Sociologist (Consultant)**

Conduct research for the completion of the socio-economic concerns of the restoration program for roads and bridges, flood control, seawall, river walls, ports and wharves.

Process survey results.

Assist in the analysis and interpretation of the data prior to submission to ADB.

Compile the socio-economic survey results.

From April 1994 : To July 1994 (4 man-months)
Employer : TCGI-ENGINEERS
Position Held :
Project Description/ : **PHILIPPINE REGIONAL MUNICIPAL DEVELOPMENT PROJECT (PRMDP)**
Duties : **Rural Sociologist/Socio-Economic Survey Team Leader**

The project involves the preparation of feasibility studies in eleven cities nationwide.

Finalized survey instruments and sample respondents prior to conduct of interviews to project beneficiaries.

Provide training to the interviewing staff hired locally before the conduct of the latter.

Supervised the conduct of socio-economic surveys in the different cities.

Responsible for the socio-economic analysis and interpretation of the data for the different sub-projects involved (Qualitative and Quantitative).

Submit in writing the finality of the services of the socio-economic survey, research and report in connection with the sub-projects involved.

Provided important statistics pertaining to the infrastructure sub-projects based on the outcome of the surveys.

Provided information on the social acceptability of the sub-projects involved, the characteristics and concerns of the proposed project beneficiaries (both rural and urban) in response to the projects.

Participated in the study of the existing management system covering the area affected by the project.

From Jan. 1994 : To April 1994 (3 man-months)
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : LGIF PROJECTS-ROADS, MARKETS,
Duties : BUS./JEEPNEY TERMINAL, *Dumaguete City*
Sociologist

Finalized survey instruments and sample respondents prior to conduct of interviews to project beneficiaries.

Provide training to the interviewing staff hired locally before the conduct of the latter.

Supervised the conduct of socio-economic surveys in the different area assignments.

Responsible for the socio-economic analysis and interpretation of the data for the Public Markets and the Tinago Bridge involved (Qualitative and Quantitative).

Submit in writing the finality of the services of the socio-economic survey, research and report in connection with the projects involved.

Provided important statistics pertaining to projects based on the outcome of the surveys.

Provided informations on the social acceptability of the projects involved, the characteristics and concerns of the proposed project beneficiaries (both rural and urban) in response to the projects.

Participated in the study of the existing management system covering the area affected by the project.

From Feb. 1993 : To Jan. 1994 (11 man-months)
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : SECOND RURAL ROADS IMPROVEMENT PROJECT
Duties : Sociologist

The project involves the preparation of feasibility study for about 100 km. of rural roads in Camarines Sur, Romblon, Masbate, Palawan, Occidental Mindoro, Oriental Mindoro and Cavite.

Finalized survey instruments and sample respondents prior to conduct of interviews to project beneficiaries.

Provide training to the interviewing staff hired locally before the conduct of the latter.

Supervised the conduct of socio-economic surveys in the different area assignments.

Responsible for the socio-economic analysis and interpretation of the data for the different road projects involved (Qualitative and Quantitative).

Submit in writing the finality of the services of the socio-economic survey, research and report in connection with the road projects involved.

Provided important statistics pertaining to the road projects based on the outcome of the surveys.

Provided informations on the social acceptability of the road projects involved, the characteristics and concerns of the proposed project beneficiaries (both rural and urban) in response to the projects.

Participated in the study of the existing management system covering the area affected by the project.

From Nov. 1991 : Dec. 1992 (14 man-months)
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : **ESF-IN-HOUSE CONSULTANCY SERVICES, LBII-TCGI JOINT VENTURE. ESFS, USAID ASSISTED**
Duties : **Sociologist**

Finalized survey instruments and sample respondents prior to conduct of interviews to project beneficiaries.

Provide training to the interviewing staff hired locally before the conduct of the latter.

Supervised the conduct of socio-economic surveys in the different area assignments.

Responsible for the socio-economic analysis and interpretation of the data for the different projects involved (Qualitative and Quantitative).

Submit in writing the finality of the services of the socio-economic survey, research and report in connection with the projects involved.

Provided important statistics pertaining to projects based on the outcome of the surveys.

Provided information on the social acceptability of the projects involved, the characteristics and concerns of the proposed project beneficiaries (both rural and urban) in response to the projects.

Participated in the study of the existing management system covering the area affected by the project.

From June 1991 : Nov. 1991 (6 man-months)
Employer : TCGI ENGINEERS
Position Held :
Project Description/ : **PHILIPPINE ASSISTANCE PROGRAM SUPPORT (PAPS) - GENERAL SANTOS CITY WATER SUPPLY ASSESSMENT AND WASTEWATER FEASIBILITY STUDY**
Duties : **Sociologist**

Finalized survey instruments and sample respondents prior to

Participated in the study of the existing management system covering the area affected by the project.

Water Districts Undertaken:

- Bubi, Camarines Sur
- Calabanga, Camarines Sur
- Naga City, Camarines Sur
- Sorsogon, Sorsogon
- Nabua, Camarines Sur
- Matnog, Sorsogon

Field Work:

Regions I, II, III and CAR

From Jan 1990 : (1 man-month)
Employer : CEST, INC. INIS CONSULTANTS, INC.
Position Held :
Project Description/ : OECF-ASSISTED WELL PROJECT
Duties : *Luzon, Visayas and Mindanao*
Sociologist/Consultant

Reviewed previous reports and/or studies relevant to the project areas on water supply (OECF-Assisted).

Performed field reconnaissance of the study areas with regard to the existing condition of the OECF constructed wells and took the locally available data on economic activity.

Submitted field reconnaissance reports and provided recommendations on the improvement of the well projects.

From July 1985 : To Dec. 1989 (54 man-months)
Employer : SOCIAL DEVELOPMENT AND RESEARCH CENTER
Position Held :
Project Description/ : PAMPANGA HEALTH NGO - A CASE STUDY
Duties : Researcher

Conducted a case study of a Health NGO in Pampanga. Tasks involved collecting basic information about the health NGO-its services, beneficiaries and how it operates in the community. Conducted focus group discussion among beneficiaries and made necessary recommendations for the improvement/betterment of the health services.

From 1984 : To 1985 (12 man-months)
Employer : INTER-UNIVERSITY RESEARCHES, UP, DE LA SALLE AND PWU
Position Held :
Project Description/ : INTERUNIVERSITY RESEARCHES
Duties : Sociologist/Research Associate

Conduct sociological, psychological, educational types of researches for the Graduate School Students of the mentioned universities depending on their topics of interests.

Assisted in the processing of the data and obtained supporting literature from various sources.

From 1982 : To 1984 (20 man-months)
Employer : ASIATIC CONSULTANTS, INC.
Position Held :
Project Description : MINDORO INTEGRATED LIVESTOCK AND DAIRY DEVELOPMENT PROJECT
Duties :

AMNAY RIVER AND MULTI-PURPOSE DAM PROJECT

Socio-Economic Survey Consultant

Drew up research design in consultation with the Project Manager.

Executed the research activities of the project according to schedule.

Submitted to the clients, progress and final reports on the data.

Submitted in writing the finality of the services of the socio-economic survey research and report in connection with the projects involved.

From 1982 : (4 man-months)
Employer : DEVELOPMENT ACADEMY OF THE PHILIPPINES
Position Held :
Project Description/ : OPERATION AND MAINTENANCE OF COMMUNAL IRRIGATION SYSTEMS IN ILOCOS SUR
Duties : Project Officer

Project Management in the socio-economic analysis at all stages in the operations and maintenance of Communal Irrigation Systems in Ilocos Sur.

Field Work:

- Sta. Maria, Ilocos Sur
- Candon, Ilocos Sur
- Sta. Cruz, Ilocos Sur
- Galimuyod, Ilocos Sur

From 1981 : To 1982 (10 man-months)
Employer : HUMAN RESOURCES CENTER
Position Held :
Project Description/ : PSYCHOLOGICAL INDICATORS IN DEVELOPMENT
Duties : Research Assistant

Formulate interviewing instruments.

Collect data on selected topics with their subsequent analysis and interpretation in the different municipalities in Nueva Ecija.

Conducted survey training to local interviewers and plan ahead of time schedules of interview.

Supervised and solve problems that arouse on field.

Facilitated group discussion to local officials.

Field Work:

- Nueva Ecija

From 1980 : To 1981 (8 man-months)
Employer : TECHNO-DURE CONSULTANTS GROUP, INC.
Position Held :
Project Description/ Duties : **5TH PACKAGE WATER SUPPLY PROJECT, FS/DE**
Sociologist cum Jr. Financial Analyst

Supervised the socio-economic survey for the conduct of the feasibility study for Bato, Tigaon-Sangay Water Supply System.

Assisted in the financial analysis of the project.

Provided administrative functions for the Senior Financial Analyst.

Water Districts:

- Tigaon-Sangay Water District
- Bato Water District

From 1975 : To 1979 (48 man-months)
Employer : INSTITUTE OF PHILIPPINE CULTURE
Ateneo de Manila

Position Held :
Project Description / Duties : **INSTITUTE OF PHILIPPINE CULTURE, ATENEO DE MANILA UNIVERSITY**, *Loyola Height, Quezon City*
Research Assistant

Finalizing survey instruments and sample respondents.

Conducted field surveys and interviews.

Assisted in the data processing for the quantitative analysis of the project.

Assisted in the interpretation and evaluation of the socio-economic data.

Projects:

- Perception of Illness and Health Intervention in the Philippines
- Utilization of Medicine Services in Metro Manila
- Social Network on Catalyses of Change
- Social Participation in Rural Development
- Social Structure and Change of the Philippine Industrial Barrio
- Role of Rural Organization in the Philippine Industrial Barrio
- Socio-economic Changes after 11 years of Agrarian Reform
- Cooperative Research Program
- The Social and Ethical Environment of Sterilization in the Philippines
- Women in Development - Phase I, Phase II

Field Work:

- Pangasinan

- Metro Manila

12. Certification :

I, the undersigned, certify, to the best of my knowledge and belief, that the information in this biodata are true and correctly describes myself, my qualifications and my experience. I understand that any willful mis-statement described herein may lead to my disqualification or dismissal, if employed or renders me liable for criminal prosecution.

Moreover, I certify that I am a full time employee of TCGI ENGINEERS and I have been employed by the firm for the last 9 years.

SIGNATURE :

DATE OF SIGNING :

Day / Month / Year

1.	**Proposed Position**	Transport/Traffic Engineer
2.	**Name**	BAYANI J. LUSICA
3.	**Date of Birth**	18 April 1956
4.	**Nationality**	Filipino
5.	**Education**	MSCE (Transportation Engineering) Asian Institute of Technology, 1983 Bangkok, Thailand B.S. Civil Engineering Misamis University Registered Civil Engineer, No. 25043 Registered Jr. Geodetic Engineer, No. 459
6.	**Professional Trainings**	MOSS MX Road, MX Site (Road/Highway Design Software), TCGI Engineers Jan. 6 to 12, 1999 Calender – Hamilton Bridging System, Balfour Beaty (Phils.), Inc., Feb. 1996, Cebu City Individual Training on Road Construction, Ministry of Construction, Tokyo, Japan, Feb. 24 to March 18, 1987 Road Construction and Pavement Management Systems, PMO-FS, DPWH, Quezon City, December 10, 1986 Transport Thailand, sponsored by HM Government, UK, Department of Transport, The Institute of Civil Engineers, The British Overseas Trade Board, Bangkok, Thailand, November 29 to December 2, 1982 Special Lecture on Optimal Location of Highways, Asian Institute of Technology, Bangkok, Thailand, October 28, 1982 Symposium and Short Course on Geotechnical Aspects of Offshore and Coastal Structures, Asian Institute of Technology, Bangkok, Thailand, December 7-18, 1981
7.	**Memberships in Professional Societies**	Philippine Institute of Civil Engineers Road Engineering Association of the Philippines Asian Institute of Technology Alumni Association
8.	**Languages**	English - Fluent Filipino - Fluent

9. **Countries of Work Experience** : Philippines, Thailand, Saudi Arabia, Vietnam

10. **Years with the Firm** : 3.25years

11. **Employment Record**

From Dec. 1998 : To Jan. 1999 (*2 man-months*)
Employer : TCGI Engineers
Position Held
Project Description/ Duties :

MONTE REAL PROJECT
Davao City
Sr. Traffic Engineer

The Monte Real Project is to be developed into a high quality sustainable residential estate, which concerns for quality, comfort and well being of residents. It is located in Barangay Langub about 4 kms. from the center of Davao City.

Prepare various scheme for presentation to the client.

Analyze and compute traffic projection based on the approved scheme.

Confirm roadway widths of the road network based on the projected traffic.

Prepare intersections layout in accordance with the forecasted traffic flow and volume.

Design signal phasing and related works.

Conduct traffic-related studies during construction.

From Sept. 1998 : To Nov. 1998 (*3 man-months*)
Employer : TCGI Engineers
Position Held
Project Description/ Duties :

VISTA DE BAY PROJECT
Calamba, Laguna
Sr. Traffic Engineer

The project refers to a 150 – ha. Property to be developed into a high and medium-high residential subdivision. It consists of two hills masterplanned such that future homeowners will have vantage view of Laguna de Bay, Mount Makiling and the Metro Manila area.

The project owners envisioned the Subdivision to be environment-friendly, that is, road design and site grading conform closely with the existing topography. Some areas are allocated as view corridors, to be planted with trees and shrubs. The water reservoir will be built on-grade, with the hill's summit. Cables for utilities will be laid underground – for power, telephone and CATV. A spine road connecting the two hills will provide access to the site.

Prepare various schemes for the presentation to the client.

Analyze and compute traffic projection based on the approval scheme.

Confirm Roadway widths of the road network based on the projected traffic.

Prepare intersection layout accordance with the forecasted traffic flow volume.

Design signal phasing and related works.

Conduct traffic-related studies during construction.

From Sept. 1997 : To Aug. 1998 *(12 man-months)*
Employer : LANDCO PACIFIC
Position Held
Project Description/ : **VARIOUS PROJECTS OF LANDCO PACIFIC**
Duties **Sr. Civil Engineer/Highway Engineer**

Prepare detailed design of Main Access Spine Roads, North and South Access Roads, Secondary and Tertiary Roads.

Supervision of roads construction.

From June 1997 : To Aug. 1997
Employer : METRO TAGAYTAY LAND CO., INC.
Position Held
Project Description/ : **BATULAO WOODLANDS MOUNTAIN RESORT**
Duties **Sr. Civil Engineer/Sr. Traffic Engineer**

Site grading of about 700 hectares of Batulao Woodlands Mountain Resort.

Traffic study of North and South Access and Main Spine Batulao Woodlands Mountain Resort.

From April 1997 : To May 1997
Employer : WOODWARD CLYDE PHILS., INC.
Position Held
Project Description/ : **CIRCUMFERENTIAL ROAD NO. 5 (C5) EXPRESSWAY (COMMONWEALTH AVENUE-MC ARTHUR HIGHWAY SECTION)**
Duties **Sr. Civil Engineer**

Preparation of Environmental Impact Statement (EIS) report.

From Jan. 1996 : To April 1997
Employer : ENGINEERING AND DEVELOPMENT CORP. OF THE PHIL. (EDCOP)

Position Held
Project Description/ : **NORTHWEST LEYTE AND SOUTH SAMAR ROAD PROJECTS**
Duties **Project Manager/Sr. Highway Designer**

Construction supervision of Northwest Leyte Road Project (Isabel - Pamplona Section), PJHL, DPWH.

Construction supervision of South Samar Road Project Package II and IV; PJHL, DPWH.

QUINGUA ACCESS ROAD, FORT BONIFACIO DEVELOP-MENT CORPORATION (FBDC)
Sr. Traffic Engineer

Prepare various schemes for the road project. Evaluate impact of the proposed component to the direct influence area of the project.

Conduct traffic-related studies including the traffic management scheme during construction.

Prepare intersection layout in accordance with the forecasted traffic flow, the signal phasing design and other related design works.

PASONG TAMO – MAGALLANES INTERCHANGE
Sr. Traffic Engineer

Prepare various schemes for the road project. Evaluate impact of the proposed component to the direct influence area of the project.

Conduct traffic-related studies including the traffic management scheme during construction.

Prepare intersection layout in accordance with the forecasted traffic flow, the signal phasing design and other related design works.

ADELFA ACCESS ROAD PROJECT, SAN PEDRO-VICTORIA COURT SECTION, LAGUNA
Sr. Highway Designer/Sr. Traffic Engineer

Design the preliminary alignment, conduct traffic study and design of pavement thickness.

Review cost estimate and prepare design report.

CONSTRUCTION OF PHILIPPINE NATIONAL RAILWAY (PNR) SORSOGON LINE EXTENSION
Project Manager

Conducted feasibility study.

CENTRAL LUZON TOURISM MASTER PLAN, REGION III
Infrastructure Planner

Preparation of Tourism Master Plan for Central Luzon.

PROPOSED PETRON REFINERY IN SOUTHERN PHILIPPINES
Sr. Civil Engineer

Site selection of the Proposed Petron Refinery in Southern Philippines (about 500 hectares of land and 16 sites inspected).

Prepare preliminary plan of seven (7) sites, prepare site grading plan, estimate civil works, layout of proposed pier for Cape and

Panamax vessels, oil depot, bunker fuel depot, tank farms, greens and housing units for Petron employees.

CONCEPTUAL PLANNING OF LRT 6, BACLARAN TO CAVITE CITY LINK
Traffic Engineer

Prepare various schemes for the transport project. Evaluate impact of the proposed improvement to the direct influence area of the project.

Prepare rerouting plan based on the implementation and construction schedule.

Conduct traffic-related studies including the traffic management scheme during construction.

Prepare Intersection layout in accordance with the forecasted traffic flow, the signal phasing design and other related design works.

From Nov. 1995 : To Feb. 1996
Employer : ECT CONSULTING ENGINEERS
Position Held
Project Description/ Duties :

PABAHAY SA RILES AND ELEVATED TOLLWAY PROJECT, MAKATI – CALOOCAN SECTION
Sr. Highway/Sr. Traffic Engineer

Design of interchange and roads.

Prepare various schemes for the transport project. Evaluate impact of the proposed improvement to the direct influence area of the project.

Prepare rerouting plan based on the implementation and construction schedule.

Conduct traffic-related studies including the traffic management scheme during construction.

Prepare Intersection layout in accordance with the forecasted traffic flow, the signal phasing design and other related design works.

PROPOSED SMOKEY MOUNTAIN AND RECLAMATION PROJECT.
Sr. Highway/Sr. Traffic Engineer

Design of interchange in the proposed Smokey Mountain and Reclamation Project.

Prepare various schemes for the transport project. Evaluate impact of the proposed improvement to the direct influence area of the project.

Prepare rerouting plan based on the implementation and construction schedule.

Conduct traffic-related studies including the traffic management scheme during construction.

Prepare Intersection layout in accordance with the forecasted traffic flow, the signal phasing design and other related design works.

From Mar. 1995 : To Dec. 1995 (*9 man-months*)
Employer : TCGI ENGINEERS
Position Held :
Project Description/ Duties :

MARIKINA BRIDGE AND C-5 RELATED ACCESS ROAD PROJECT
Sr. Traffic Engineer

Prepare various schemes for the transport project. Evaluate impact of the proposed improvement to the direct influence area of the project.

Prepare rerouting plan based on the implementation and construction schedule.

Conduct traffic-related studies including the traffic management scheme during construction.

Prepare Intersection layout in accordance with the forecasted traffic flow, the signal phasing design and other related design works.

LRT 3 PROJECT
Sr. Traffic Engineer

Study of the impacts and specifications for mitigation measures in relation to traffic access to residence relocation of squatters and businesses, noise, air quality, water quality, utilities relocation, vegetation removal, etc. during construction and operation of the Light Railway Transit along Metro Manila's main thoroughfare. The study will also include sewage treatment plant and the maintenance facility for this project.

Prepare various schemes for the transport project. Evaluate impact of the proposed improvement to the direct influence area of the project.

Prepare rerouting plan based on the implementation and construction schedule.

Conduct traffic-related studies including the traffic management scheme during construction.

Prepare Intersection layout in accordance with the forecasted traffic flow, the signal phasing design and other related design works.

From Dec. 1994 : To Feb. 1995
Employer : PROCONSULT ENGINEERS
Position Held
Project Description/ : PUBLIC MARKET AND BUS TERMINAL
Duties PROJECTS, BAYUGAN, AGUSAN DEL SUR.
Team Leader/Sr. Traffic Engineer

Conduct market demand studies, estimate number of stalls needed for different commodity types, estimate rental rates, prepare preliminary design of the proposed market, estimate construction costs, estimate operation and management costs, conduct financial and economic evaluation, prepare study report.

Conduct traffic study, origin-destination and number of buses and jeepneys in the area, design the size of the terminal, estimate construction cost, estimate terminal fee for buses and jeepneys, conduct financial and economic evaluation, prepare study report.

From Sept. 1994 : To Nov. 1994
Employer : PERT CONSULT INTERNATIONAL
Position Held
Project Description/ : ADB SECOND ROAD IMPROVEMENT
Duties PROJECT, VIETNAM
Sr. Traffic Engineer

Detailed design of about 800 km. of national road (PRC border – Hanoi and Dong Ha – Nha Trang Sections)

Prepare various schemes for the transport project. Evaluate impact of the proposed improvement to the direct influence area of the project.

Prepare rerouting plan based on the implementation and construction schedule.

Conduct traffic-related studies including the traffic management scheme during construction.

Prepare intersection layout in accordance with the forecasted traffic flow, the signal phasing design and other related design works.

From March 1994 : To Aug. 1994
Employer : EDCOP/PHILTECH
Position Held
Project Description/ : METROPOLITAN AND SUBURBAN MASS
Duties TRANSPORT SYSTEMS STUDY
Sr. Traffic Engineer

Feasibility study of Metropolitan and Suburban Mass Transport Systems using existing PNR tracks.

Prepare various schemes for the transport project. Evaluate impact of the proposed improvement to the direct influence area of the project.

Prepare rerouting plan based on the implementation and construction schedule.

Conduct traffic-related studies including the traffic management scheme during construction.

Prepare Intersection layout in accordance with the forecasted traffic flow, the signal phasing design and other related design works.

From Dec. 1993 :
To Feb. 1994
Employer : PROCONSULT ENGINEERS
Position Held and Description of Duties :

VARIOUS PROJECTS OF PROCONSULT ENGINEERS
Sr. Civil Engineer

Feasibility study for Ligao and Camalig public markets and Daraga bus terminal under Local Government and USAID fund.

From Jan. 1992 :
To Dec. 1993
Employer : ENGINEERING AND GEOLOGY CONSULTANTS, INC.,
Riyadh, Saudi Arabia

Position Held
Project Description/ Duties :

QASSIM-MADINAH EXPRESSWAY, RIYADH, SAUDI ARABIA
Sr. Highway Engineer/Sr. Traffic Engineer

Detailed engineering design of Qassim – Madinah Expressway (420 km of six lane divided highway). Design of 35 diamond inter-changes and one cloverleaf, agricultural roads in Baha, Najran and Assir regions including two (2) sections of King Khaled and Baha mountain descents, detailed design of municipal roads in Riyadh (Baladiah).

In the supervisory level, plan, schedule, conduct and coordinate detailed phases of highway/road engineering.

This includes:

- Carrying out of road inventory and curve survey of the highway project.
- Undertaking studies of existing pavement structures, identifying the pavement condition and strength and the most cost-effective way of rehabilitating the pavement.
- Preparation of designs and computations of element of curves with due consideration to super elevation, percent of grade, transition of curves and other factors affecting horizontal control.
- Familiarization with the condition of contracts, specifications, method of measurements, bill of quantities, drawings, site investigation, reports and other documents related to the contract.

Prepare various schemes for the transport project. Evaluate impact of the proposed improvement to the direct influence area of the project.

Prepare rerouting plan based on the implementation and construction schedule.
Conduct traffic-related studies including the traffic management scheme during construction.

Prepare Intersection layout in accordance with the forecasted traffic flow, the signal phasing design and other related design works.

From Oct. 1991 To Jan. 1992
Employer : PROCONSULT ENGINEERS
Position Held :
Project Description/ Duties :

R1 EXPRESSWAY EXTENSION PROJECT
Sr. Traffic/Sr. Transport Engineer (Consultant)

Feasibility Study of R1 Expressway Extension Project, Clark Air Base Conversion Project, Metro Manila Military Camps Conversion Project.

Prepare various schemes for the transport project. Evaluate impact of the proposed improvement to the direct influence area of the project.

Prepare rerouting plan based on the implementation and construction schedule.

Conduct traffic-related studies including the traffic management scheme during construction.

Prepare Intersection layout in accordance with the forecasted traffic flow, the signal phasing design and other related design works.

From Sept. 1989 To Sept. 1991 (*24man-months*)
Employer : TCGI ENGINEERS
Position Held :
Project Description/ Duties :

VARIOUS PROJECTS OF TCGI ENGINEERS
Sr. Traffic Engineer/Sr. Highway Engineer
Detailed design of C5 (Package "A").
As Team Leader/Sr. Traffic Engineer
Feasibility study of Manila-Bataan Coastal Road Project

Prepare various schemes for the transport project. Evaluate impact of the proposed improvement to the direct influence area of the project.

Prepare rerouting plan based on the implementation and construction schedule.

Conduct traffic-related studies including the traffic management scheme during construction.

Prepare Intersection layout in accordance with the forecasted traffic flow, the signal phasing design and other related design works.

As Sr. Highway Engineer

Detailed design of DEAF Access Road.

In the supervisory level, plan, schedule, conduct and coordinate detailed phases of highway/road engineering.

This includes:

- Carrying out of road inventory and curve survey of the highway project.
- Undertaking studies of existing pavement structures, identifying the pavement condition and strength and the most cost-effective way of rehabilitating the pavement.
- Preparation of designs and computations of element of curves with due consideration to super elevation, percent of grade, transition of curves and other factors affecting horizontal control;
- Familiarization with the condition of contracts, specifications, method of measurements, bill of quantities, drawings, site investigation, reports and other documents related to the contract.

From Jan. 1989 : To Aug. 1989
Employer : PMO-RURAL INFRASTRUCTURE FUND (USAID)
Position Held
Project Description/ : VARIOUS PROJECTS UNDER PMO-RURAL INFRA
Duties -STRUCTURE FUND (USAID)
Head Civil Engineer (C.E. IV)

Review, change and recommend to the Director the Contract for Consultancy between DPWH and Consultants.

Review, change and recommend to the Director the Contract for Road Construction between DPWH and Contractors.

Team Leader
Detailed design of Calayan Project
Feasibility study of Balasan – Carles Road Project

From July 1983 : To Dec. 1988
Employer : PMO-FEASIBILITY STUDY, DEPT. OF PUBLIC WORKS AND HIGHWAYS (DPWH)

Position Held
Project Description/ : VARIOUS PROJECTS UNDER PMO-FEASIBILITY
Duties STUDY, DPWH
Team Leader/Sr. Traffic Engineer

Feasibility study of Bacolod City Circumferential and Radial Road Projects (World Bank Fourth Urban Loan).
Feasibility Study of Jct. Bauan – Mabini Loop Road (16th OECF Yen Credit under tourism roads package).

Feasibility Study of Carmona – Ternate – Nasugbu Road and Navas – Caticlan Road (Two Road sections approved by NEDA board for the 15th OECF Yen Credit under tourism roads package).

As Project Engineer/Team Leader
Detailed design of Ilocos Norte national secondary and provincial road network (a total of about 200 km.)

Represent the consultant and make decisions on all matters pertaining to the services.

Organize and coordinate all activities in the conduct of detailed engineering services for the project.

Make decisions on problems related to the project.

Maintain liaison with the Client, other key staff, and other parties involved with the implementation of the project.

Arrange and chair regular and special meetings with the project team.

Prepare, finalize and submit implementation program and all other requirements.

Submit all reports and documents required and ensure efficient administration and speedy execution of the services.

Field Coordinator/Sr. Traffic Engineer
Feasibility study for the reconstruction/rehabilitation of about 730 bridges along arterial roads in Luzon and Visayas.

Prepare various schemes for the transport project. Evaluate impact of the proposed improvement to the direct influence area of the project.

Prepare rerouting plan based on the implementation and construction schedule.

Conduct traffic-related studies including the traffic management scheme during construction.

Prepare Intersection layout in accordance with the forecasted traffic flow, the signal phasing design and other related design works.

Sr. Highway Engineer
Feasibility study of about 1,100 km of National Roads under the 5th UNDP/ADB/Swiss Government assistance

Prepare various schemes for the transport project. Evaluate impact of the proposed improvement to the direct influence area of the project.

Prepare rerouting plan based on the implementation and construction schedule.

Conduct traffic-related studies including the traffic management scheme during construction.

Prepare Intersection layout in accordance with the forecasted traffic flow, the signal phasing design and other related design works.

Transport Planner
Feasibility study of Pan-Philippine Highway
Philippine-Japan Friendship Highway

Traffic Engineer
Pavement and Axle Load Study (IBRD assisted study)

Feasibility Study of Carmen – Bayambang – Manat Road Region I, DPWH

Design of three intersections in Iloilo – Jaro diversion.

Feasibility study of Dacutan Access Road (Iloilo)

Local transport Improvement Scheme II (Legaspi City)

From Aug. 1980 : To June 1983
Employer : EDCOP
Position Held
Project Description/ : VARIOUS PROJECTS OF EDCOP
Duties Chief Surveyor

Topographic survey of Molave – Oroquieta Road and Tukuran – Pagadian City road (about 130 km.) under ADB assistance for Philippine Island Roads Improvement Project.

Road location and Parcellary Survey
a. Talaba – Paliparan Road (Cavite)
b. General Trias – Tagaytay Road
c. Amuyong – Bailen Road (Cavite)

Topographic survey for the Water Supply Project in Bayambang, Pangasinan.

Topographic survey for the Water Supply Project in San Andres, Tablas, Romblon.

Topographic Survey for the Water Supply Project in Sta. Cruz, Laguna.
Topographic Survey of about 20 bridgesites in Tablas, Romblon.

From June 1980 : To July 1980
Employer : DEVELOPMENT AND TECHNOLOGY CONSULTANTS, INC.

Position Held
Project Description/ : VARIOUS RURAL ROADS IN LUZON
Duties Draftsman/Cost Estimator

Detailed design of Rural Roads in Luzon.

From Jan. 1976 : To April 1976
Employer : CITY ENGINEERS OFFICE
Position Held
Project Description/ : TOPOGRAPHIC SURVEY, CAGAYAN DE ORO CITY
Duties Surveyor/Instrumentman

Topographic survey of two access roads in Gusa, Cagayan de Oro City.

From June 1975	:	To Nov. 1975
Employer	:	JAPAN OVERSEAS CONSULTANTS
Position Held		
Project Description/	:	MINDANAO SECONDARY AND FEEDER ROADS, ADB ASSISTED PROJECT, MPWH. Economic Researcher Conducted feasibility study.

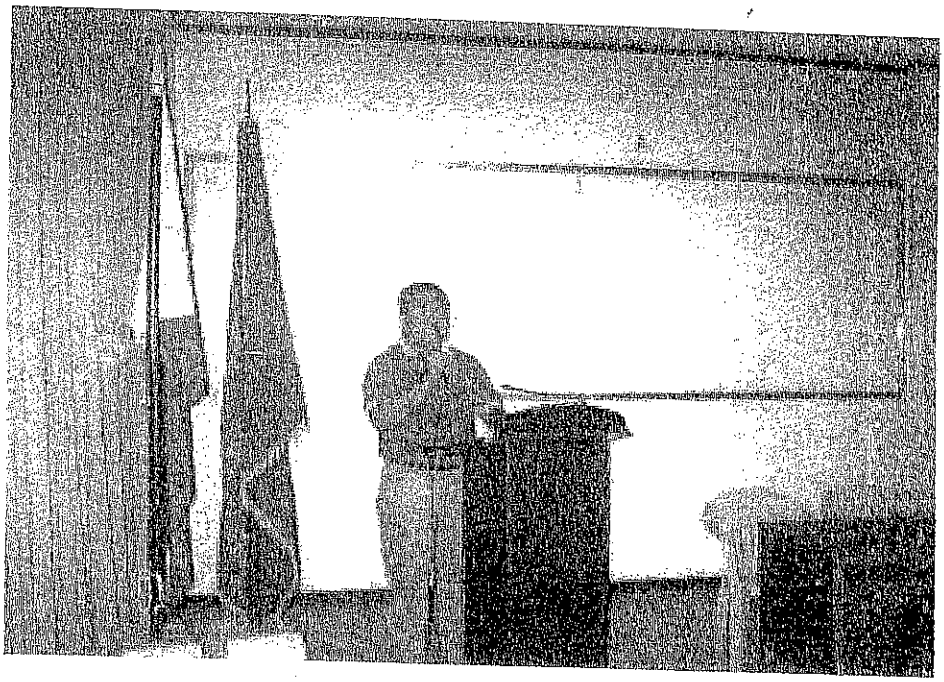
12. **Certification** :

I, the undersigned, certify to the best of my knowledge and belief, that the information in this biodata are true and correctly describes myself, my qualifications and my experiences. I understand that any willfull misstatement described herein may lead to my disqualification or dismissal, if employed or renders me liable for criminal prosecution.

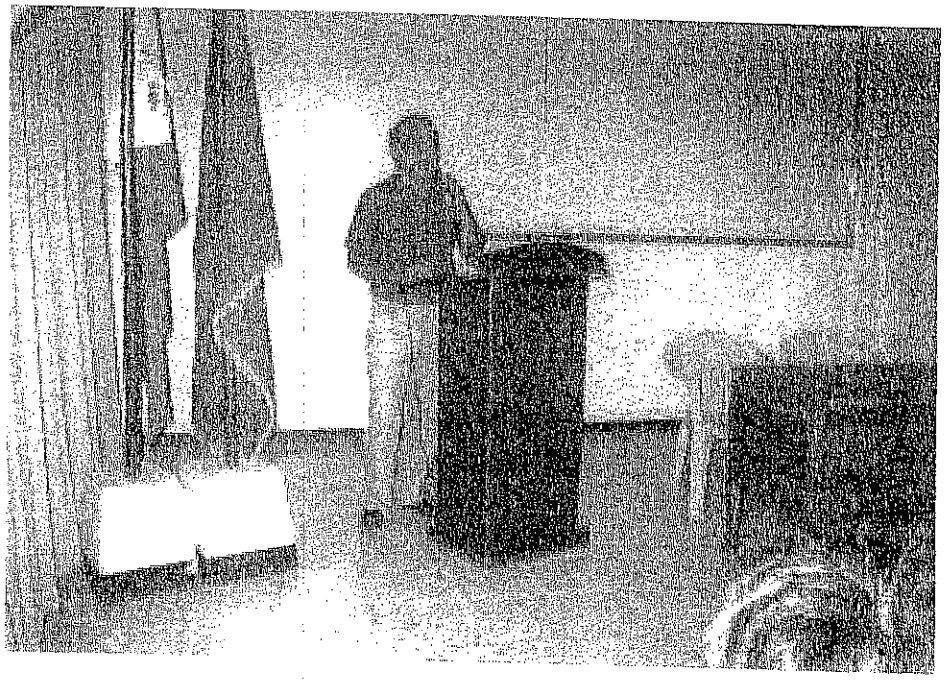
Moreover, I certify that I am a full time / part time employee of TCGI Engineers and I have been employed by the firm for the last 3.25 years.

SIGNATURE :

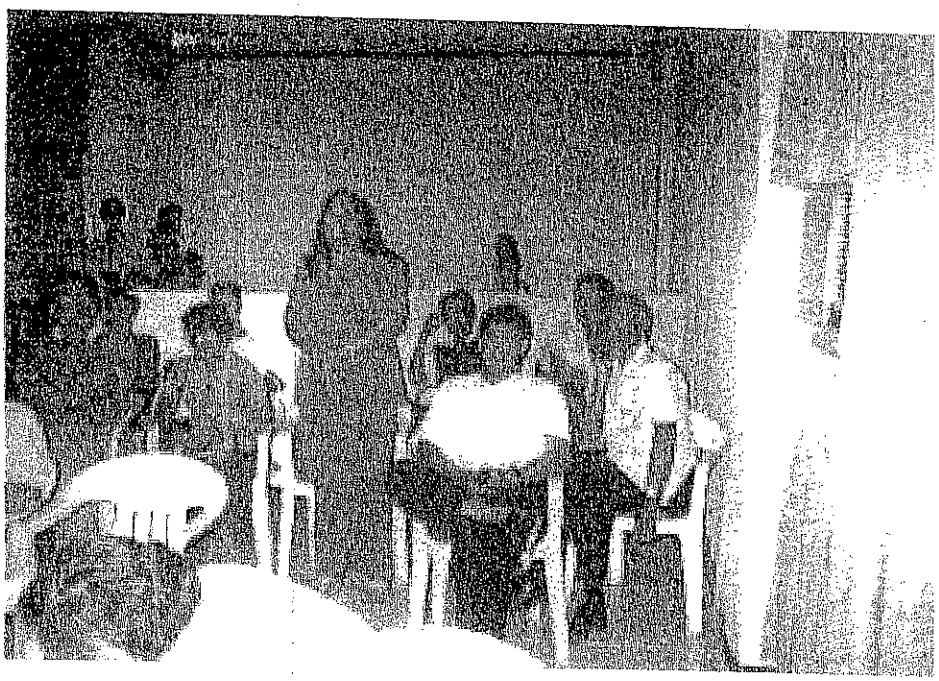
DATE OF SIGNING : / /
Day Month Year



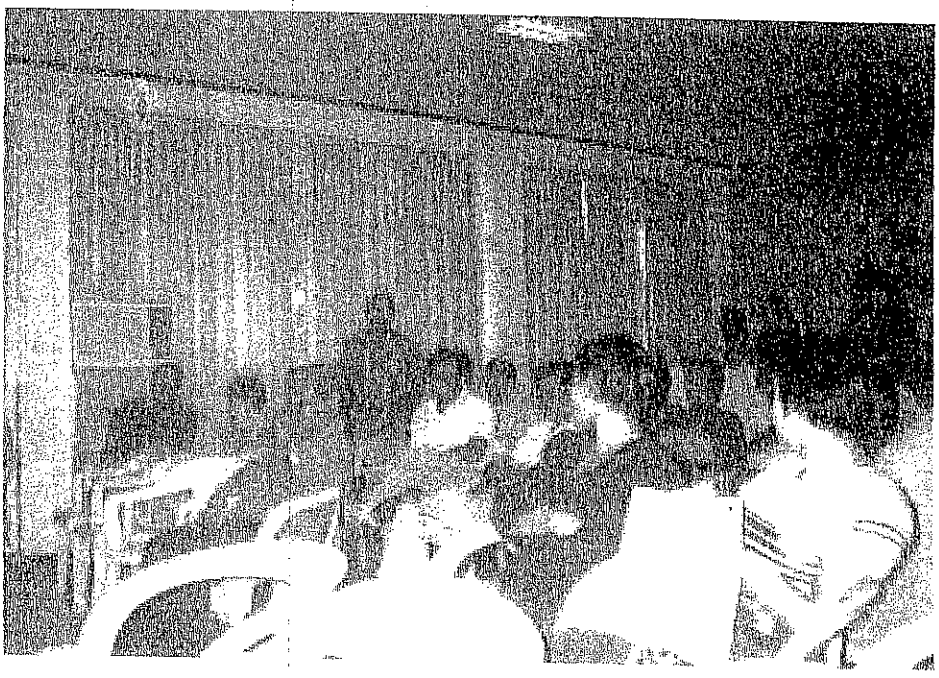
Bohol Governor, Rene Relampagos



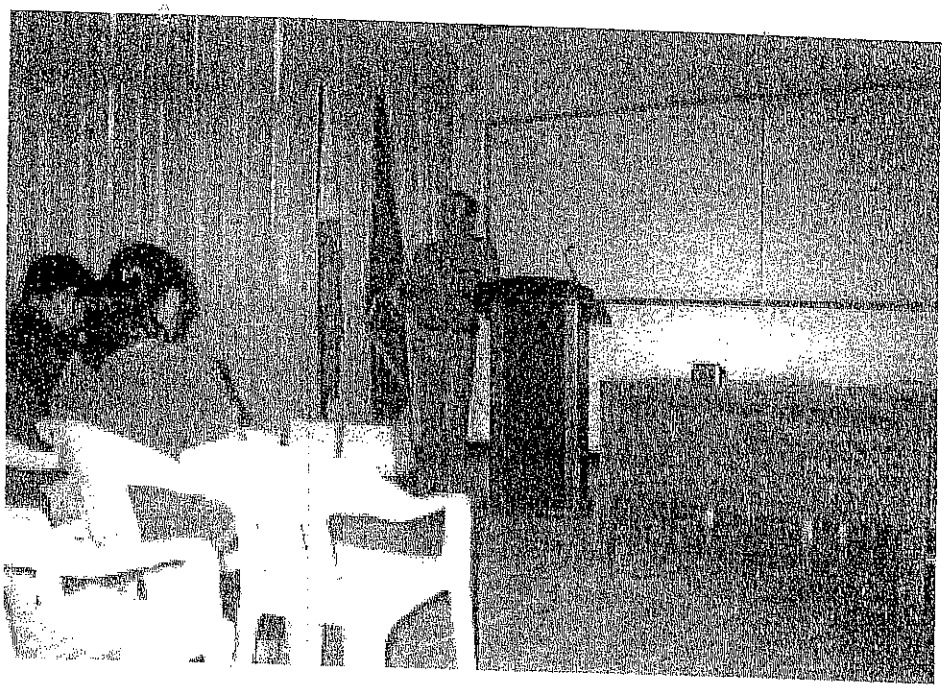
Vice Mayor Benedicto H. Alcala Panglao, Bohol



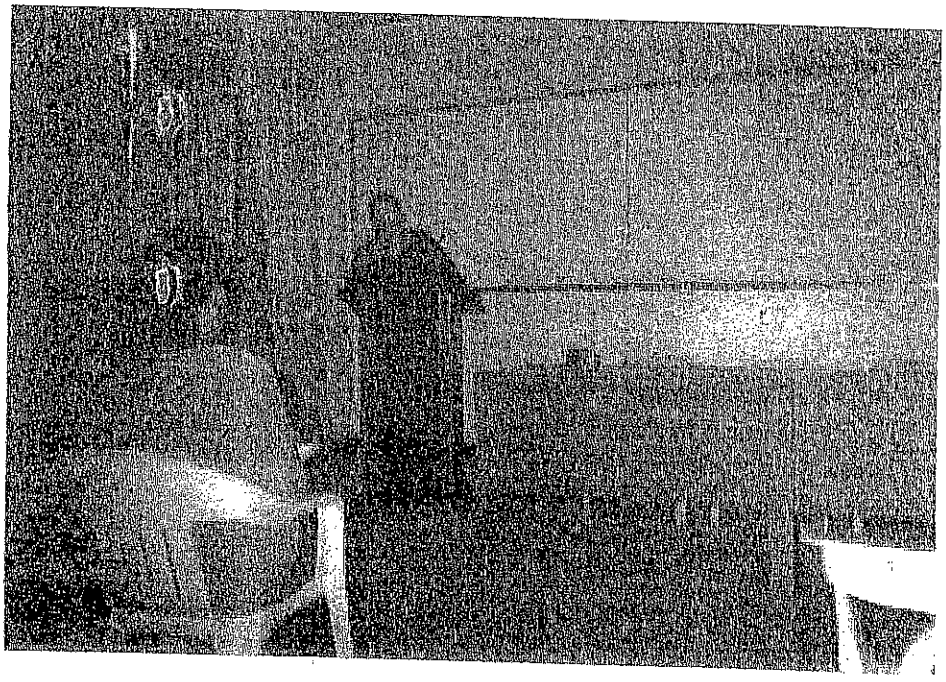
From left seated, Governor Relampagos and Standing, Kagawad Saturnina L. Hernando



Participants During the Second Scoping Session

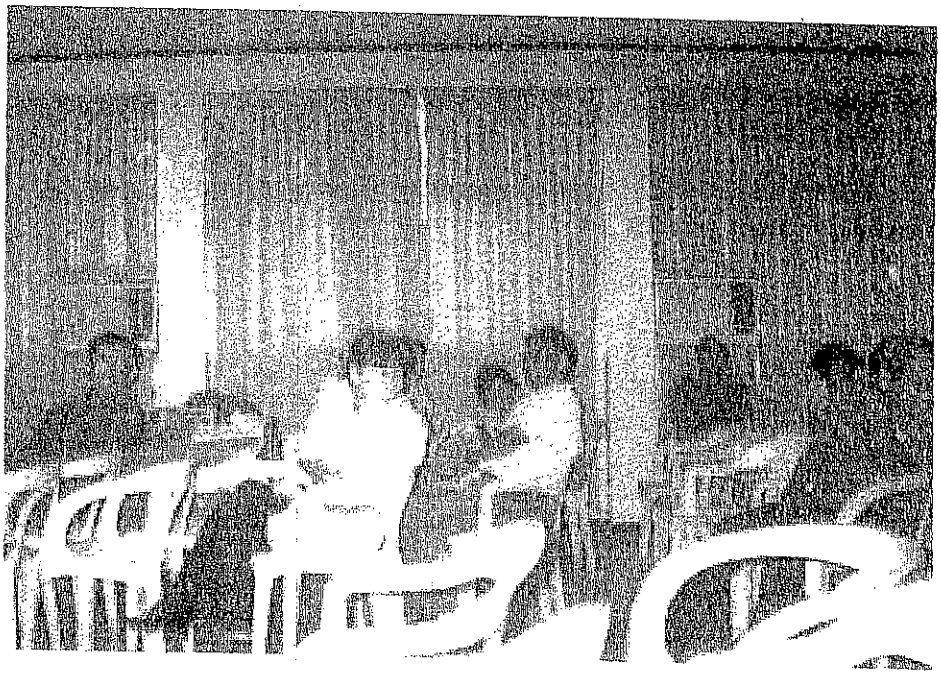


Project Director Engr. Crescencio S. Rocamora (standing)

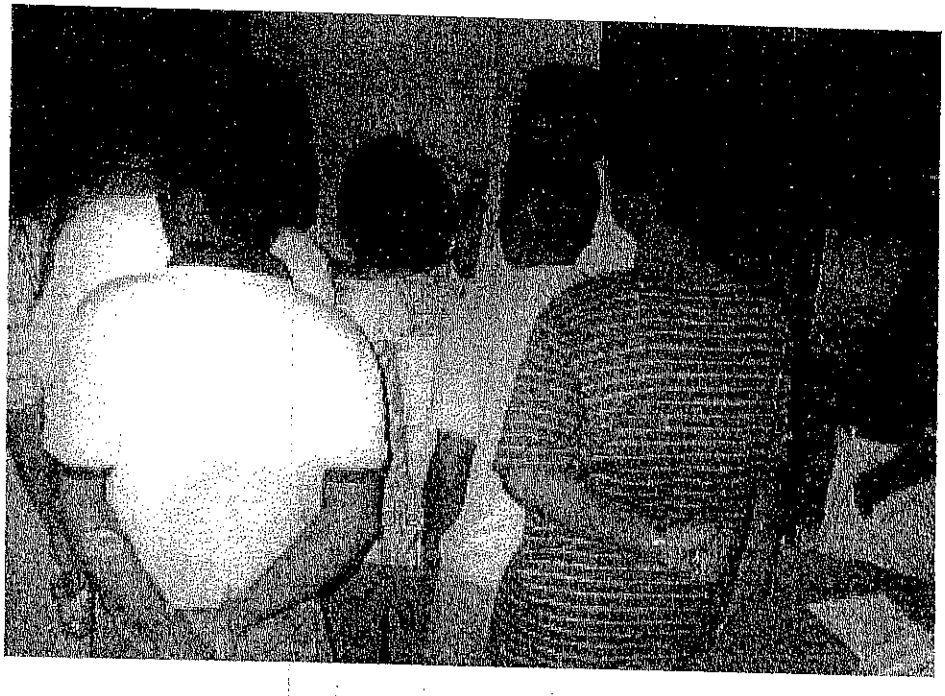


Conrado L. Ajero, Project Manager 1V (standing)

Engr. Marcelo B. Delpin, Jr. of TCGI presented the Proposed Airport Project in Panglao during the 2nd Scoping Session



TCGI Engineers/Consultants and Barangay Captains



Bohol Governor Relampagos and the Stakeholders

Residents of Tawala and Bolod During the 3rd Formal Scoping Session

APPENDIX III

SCOPING REPORTS & TOURISM ESTATE TASK FORCE MEETING

TCGI ENGINEERS

Ref.: CVA-L00-035

04 July 2000

OFFICE OF THE REGIONAL DIRECTOR
ENVIRONMENTAL MANAGEMENT BUREAU
Green Plains Subdivision
Banilad, Mandaue City

Attention : DIRECTOR ALAN C. ARRANGUEZ

Subject : REQUEST FOR FIRST SCOPING SESSION
CENTRAL VISAYAS AIRPORTS PACKAGE

Sir:

Our company was engaged by the Central Visayas Development Projects Coordinating Committee to prepare the feasibility studies for proposed airports in Bais City (Negros Oriental) and Panglao (Bohol). Among the services under our agreement is the preparation of Environmental Impact Statement (EIS) for both airports.

In connection with this, may we request in behalf of the project proponent for a First Level Scoping Session with your staff preferably on July 10, 2000.

Attached are brief Project Descriptions, one each for Proposed Bais City Airport and Proposed Panglao Airport, for your reference. We will be coordinating with you for the necessary arrangements regarding the said session.

Thank you.

Very truly yours,

AURELIO L. CARPIO
Project Manager

/mlvg

FIRST SCOPING SESSION
BAIS AND PANGLAO AIRPORTS

Date : 10 July 2000
Venue : EMB Region VII Office
Banilad, Mandaue City

Attendees:

1.	Crescencio M. Rocamora	-	MDCP/DPWH/CVDPCC
2.	Alan C. Arranguez	-	DENR-EMB
3.	Annabeth Roble	-	DENR-EMB
4.	Aurelio L. Carpio	-	TCGI Engineers
5.	Andrelita J. Sto. Domingo	-	TCGI Engineers
6.	Lourdes M. Icban	-	TCGI Engineers
7.	Richard J. Excelise	-	CVDPCC
8.	Joel M. Lafuente	-	CVDPCC

A. **Overview of the Proposed Projects, by Engr. Aurelio L. Carpio (Acting Project Manager)**

1. *Project Locations and Alternative Sites*

- The main project components are two proposed airports – one to serve Bohol province and another to serve Negros Oriental.
- The projects are being coordinated and monitored by the Central Visayas Projects Development Coordinating Committee (CVPDCC) and the Consultant preparing the feasibility study is TCGI Engineers.
- There are three (3) alternative sites in Bohol, namely: (1) Panglao, (2) Dauis, and (3) upgrading the existing Tagbilaran airport.
- There are three (3) alternative sites in Negros Oriental, namely: (1) Bais City offshore within North Bais Bay, (2) Bais City inland on existing sugarcane plantation, and (3) upgrading the existing Dumaguete airport.

2. *Recommended Airport Sites*

- Based on briefly discussed criteria covering airport accessibility, safety, social, construction and environmental considerations, the recommended sites are Bais and Panglao.

3. *Project Components and Phasing*

- Envisioned construction phasing consists of Phase I (design year 2010, airport opening year 2005) and Phase II (design year 2020, opening year 2015).

- Runway length for Phase I is 2.50 kms, with additional 0.50 km. under Phase II; runway width is uniform at 45m.

- Project components consist of:

  - landside structures – passenger and cargo terminal buildings, air control tower, administration building

  - airside facilities – runway, taxiway and apron

  - air navigation systems (ANS)

  - auxiliary facilities – airport rescue and fire fighting building (ARFF) and fuel tank farm

  - airport utilities/miscellaneous works – access road and vehicle parking, water supply system, power supply system, telecom system, sewer system, perimeter fence, etc.

- Initially, the proposed total area of the project was 144 has. but considering the suggestion of Gov. Rene Relampagos of Bohol that development of facilities beside the terminal buildings should complement the airport and also to prevent squatter shanties from sprouting all over, the total area was increased to 280 has. that will include tourism related facilities and light industries.

B. Comments/Reminders by EMB Director Alan C. Arranguez

1. *Review Fund*

- Must be allocated by the project proponents to provide sufficient amount for the review of the EIS Report by Specialists (on water, air, social development, airport planning, etc.) prior to the granting of ECC.

2. *Monitoring Fund*

- Must be allocated by the project proponents to provide fund for a multipartite monitoring team that will safeguard and guarantee the

compliance of the project owner (ATO or the airport management) to specific environmental provisions.

3. *Environmental Guarantee Fund*

- An amount that will be used to clean up any environmental spoils or spillage or to be used during emergencies and must be replenished by the project proponents regularly

4. *Environmental Geologic and Geohazard Assessment Report (EGGAR)*

- A report to be prepared by the Environmental Specialist with the aid of a Geologist or Geological Engineer, possibly, to determine the geologic safety of the proposed site (against possible collapse, foundation inadequacies, sinkholes, other soil formations) prior to the granting of ECC.

- Bais site may be exempted from EGGAR while the possibility of sinkholes must be checked in Panglao site.

5. **Comprehensive Agrarian Reform Program (CARP)**

- DENR/EMB always cautions project developers (government or private) that the project site must be free from any possible land appropriations for farm tenants.

- The Consultant and CVPDCC will double-check the sites against any CARP appropriations.

6. **Land Use Conversion**

- Dir. Arranguez also cautioned the Consultant and CVPDCC that agricultural lands should have been legally converted to commercial/industrial usage prior to construction.

7. **Displacement of Local People**

- Dir. Arranguez commented that local people must be given priority to any job openings during construction and during operation, which is in line with the skills/expertise demanded by the job.

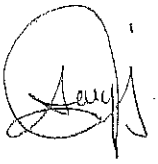
- Displaced people must also be properly resettled.

8. **Proper Waste Disposal**

- Dir. Arranguez reminded the Consultant that proper disposal of solid and liquid wastes must be incorporated in the airport design.

- Coordination with the City or Municipality must be made regarding collection of solid wastes.

9. DENR Director, Mr. Alan Arranguez advised the proponent and consultant to conduct the second scoping session (public consultation) at the project site.



3RD PITE INTER-AGENCY TASK FORCE MEETING
03 October 2000, 2:00 PM
DOT Auditorium

I Call to Order

II. Review of minutes of previous meeting and approval thereof

III Business Arising from the Minutes of Previous Meeting

IV Updates :

1. Tagbilaran Airport (c/o DOTC, ATO)
2. Panglao Airport (c/o Provincial Government)
3. LGU-Initiated Projects:
   - 3.1 Panglao Road Development (c/o Provincial Government)
   - 3.2 Water Supply (c/o Provincial Government)
   - 3.3 Solid Waste Management [Landfill] (c/o Provincial Gov't.)
4. DOT and Inter-agency Projects
   - 4.1 PITE Environmental Impact Assessment (c/o Seasterns, DOT)
   - 4.2 Delineation of PITE Study Area (c/o DENR)
   - 4.3 Panglao Craft Village (c/o LGU-Panglao)
   - 4.4 Panglao Review and Development Committee (c/o Provincial Government)
5. Others:
   - 5.1 Proclamation of Delineated PITE Study Area as Tourism Estate (c/o DENR)
   - 5.2 Re-classification of Panglao Island (Amendment of PD 2152) (c/o DENR)
   - 5.3 Revised Guidelines on "Moratorium on the Disposition and Granting of Any Title, Concession, Permit or Lease on All Islands with Areas 50,000 Has. or Less" (c/o DENR)
   - 5.4 Preparation of TOR for the Formulation of the Panglao Island Tourism Master Plan (c/o DOT-OTOP)

V. Other Matters

VI. Adjournment

USEC. EVELYN B. PANTIG, CESO I
Presiding Officer

2nd PANGLAO ISLAND TOURISM ESTATE INTER-AGENCY TASK FORCE
28 July 2000, 3:00 P.M.
DOT Training Room

MINUTES OF THE MEETING

I. ATTENDANCE

Usec. EVELYN B. PANTIG	-	DOT
Gov. RENE L. RELAMPAGOS	-	Province of Bohol
Mayor TORIBIO BON	-	Municipality of Panglao
Mayor CESAR LOPEZ	-	Municipality of Loon
DGM DION DIAZ	-	PTA-Infrastructure
Dir. ELIZABETH F. NELLE	-	DOT-OPRD
Atty. DEXTER BERNALES	-	Office of Cong. Erico Aumentado
Mr. ANGELO DE DIOS	-	2nd District, Bohol Central Visayas Project Dev't Coordinating Committee (CVPDCC)
Mr. CONRADO AJERO	-	CVPDCC
Engr. AURELIO CARPIO	-	TCGI Engineers
Mr. RAMIL A. BAGABALDO	-	TCGI Engineers
Mr. LUIS I. MALLONGA	-	TCGI Engineers
Mr. MARCELO B. DELFIN JR.	-	TCGI Engineers
Mr. ROMULO M. PAREDES	-	Cebu Eng'g. Dev't. Corp. (CEDCO)
Mr. ALEXANDER L. RAMIREZ	-	CEDCO
RED AUGUSTUS MOMONGAN	-	DENR-Region VII
Mr. BONIFACIO RIVERA	-	DENR-Region VII
Dir. PATRIA AURORA B. ROA	-	DOT-Region VII
Engr. RAFAEL LAVIDES	-	DOTC
Mr. EMMANUEL S. BATE	-	SEASTEMS, Inc.
Ms. JESSICA SAN ANDRES	-	ATO
Ms. CAROL CANUEL	-	DPWH
Ms. EMMA PELAYO	-	DPWH
Ms. LILIOSA B. LIBOSADA	-	DOT-OPRD
Ms. THELMA BAG-AO	-	DOT-OPRD
Ms. MARY ANNE PAGGABAO	-	DOT-OTC
Mr. TOM HALIM	-	DOT-OTC
Ms. DEIRDRE DE LA SANTA	-	DOT-OTC
Mr. ALAINE QUESEA	-	DOT-OTDP

II. CALL TO ORDER

The meeting was called to order by Usec. Evelyn R. Pandy of DOT. All invitees were present except the representative from the Office of Congressman Ernesto Herrera and Mayor Joel Bomedlano of the Municipality of Dauis, Panglao Island.

III. REVIEW AND APPROVAL OF MINUTES OF PREVIOUS MEETING

The minutes of the meeting held last April 26, 2000 was reviewed by the body and the following corrections were made:

1. **Upgrading of Tagbilaran Airport, item A.1.**

   Ms. San Andres of ATO informed the body that Asian Spirit has a regular flight from Manila to Tagbilaran. Hence, the statement "there is no airline servicing the airport at present..." should be rewritten as ***" PAL is not servicing the airport at present since there is a need to extend the existing runway in order to accommodate PAL's B737 aircraft."***

2. **E.1 House Bill 9520, 4th and 5th sentence**

   "The Provincial Government of Bohol will be provided with funds by CVPDCC to be sourced from its P932M budget for Year 2000 intended for conduct of feasibility studies for identified infrastructure projects in Central Visayas, CVPDCC operations and right of way acquisition activities. Funds for Panglao airport site acquisition will also be sourced from said budget."

3. **E.3 Classification of Panglao Island as Mangrove Reserve Area**

   Presidential Decree 2152 should be changed to ***"Presidential Proclamation 2152."***

There being no more comments/corrections raised, the minutes were approved by the body.

IV. HIGHLIGHTS OF THE MEETING

The meeting focused on the updates on the commitments made by each agency during the last task force meeting held on April 26, 2000. Each member present was provided with a copy of said updates as gathered by the Secretariat. Following were the highlights:

A Upgrading of Tagbilaran Airport

A.1 Ms. San Andres of ATO reported that a coordination meeting was held on July 26, 2000 between DOTC, ATO, PAL and Cong. Aumentado regarding the extension of the existing runway being required by PAL prior to the resumption of its operation at the Tagbilaran Airport targetted for November 2000. During said meeting, DOTC reported that a 317-meter runway extension is required to meet the 1,800-meter minimum length requirement for a B737 aircraft operation. (Note: present runway length is 1,483 meters). Out of the required 317 meters, DOTC can only commit a 238-meter runway extension by end of October 2000. Hence, it is not possible for PAL to resume its operations within the year.

A.2. On the status of land acquisition, Gov. Relampagos cited that the Provincial Government had acquired a land that will cover a 120-meter runway extension with funds from DPWH. The area was levelled-off and compacted using Provincial Government's funds. DOTC has now taken on the acquisition of the additional land to complete PAL's required runway extension (400 x 150 meters).

Engr.Lavides reported that DOTC-Project Management Service, the unit directly involved with the runway extension project, is already processing the payment for the negotiated properties. The deed of sale is being reviewed by DOTC-Legal Service. Funds for this will be sourced from the P17.1 M DOTC 1997 GAA allocation.

Gov. Relampagos inquired if the P17.1 M will be enough to complete the land acquisition for the required runway extension. Engr. Lavides will check this out with DOTC-PMS since he is not sure of the cost involved.

A.3. With regard to the actual runway extension, Engr. Lavides informed the body that DOTC has allocated P12.5 M for this purpose from its 2000 GAA budget. DOTC-PMS has completed the bidding process for the project and the contract will be awarded to the winning bidder by August 2000. Engr. Lavides will check with PMS the total length of runway that will be covered by said amount.

Engr. Lavides further mentioned that DOTC included the civil works for the runway extension in its proposed 2001 work program with a budget of P20 M. However, he is not sure if the whole amount will be released to DOTC in view of DBM's imposition to reduce the 2001 proposed GAA budget.

B.3 Following are some of the comments raised on TCGI's presentation:

B.3.1 On the projection of the maximum capacity of the airport terminal, Usec. Puntig suggested that TCGI translate the maximum number of aircraft that can be accommodated by the runway and apron into number of passengers on an annual basis since the DOT bases its projection of tourist arrivals on this.

B.3.2 On the design of the terminal, DOT-Region VII Director Dawnie Roa suggested the provision of boarding bridges/tubes which link the terminal directly to the aircraft. TCGI will consider Dir. Roa's suggestion in designing the terminal building for the Phase II of the project. In Phase I, provision of boarding tubes will not be necessary since the terminal is designed as a single-storey structure.

On this note, Mr. De Dios of CVDPCC informed the body that last July 19, 2000, the recommendations for Phase I and II as presented in the study were presented to DOTC Secretary Vicente Rivera, NEDA Deputy Director General Roberto Alonzo and DOTC Asec. George Esguerra. It was decided that Phase I and II will be combined as one stage of the airport development project.

Gov. Relampagos added that additional foreign tourist arrivals to be generated as a result of Bohol's intensive international sales blitz on the tourism potential of the province should also be considered in the design of the terminal.

C. LGU-Initiated Projects

C.1 Panglao Road Development

Engr. Romulo Paredes of CEDCO, Inc., the consulting firm contracted by CVPDCC to prepare the feasibility study for the Panglao Road Development Package, presented the status of the conduct of the study. Following are the highlights of the presentation:

C.1.a Following are the road networks covered by the feasibility study:

- Panglao Circumferential Road
- Dauis-Panglao Central Road
- 2 causeways linking Panglao island to Tagbilaran City

C.1.b CEDCO, Inc. has already completed the conduct of the following surveys:

- Engineering Surveys
- Socio-economic Surveys
- Environmental Scanning

C.1.c Estimated total construction cost for the proposed development totals to P583.74 million

C.1.d The feasibility study is 84% completed. Below is the timetable to be followed for the remaining activities:

Submission of draft final report	-	July 30,2000
Start of detailed engineering	-	August 2000-April 2001
Submission of feasibility study and implementation plan to NEDA-ICC	-	1st week of August 2000
Evaluation by NEDA-ICC	-	Aug-Sept 2000
Arrival of JBIC fact finding committee	-	Oct.-Nov. 2000
Appraisal mission of JBIC	-	Mar.-May 2001
Pledging Session	-	July 2001
Effectivity of loan	-	January 2002

C.2 **Water Supply.**

The Bohol-PBAC has issued the notice of intent to award to the winning bidder the joint venture agreement for the rehabilitation and operation of the provincial waterworks system last April 28,2000.

Gov. Relampagos reported that the Sanggunieng Panlalawigan was about to deliberate on the possible passage of an ordinance and a resolution to pursue the project and to authorize the Governor to enter into a contract with the most qualified bidder; however, the Regional Trial Court issued a Temporary Restraining Order (TRO) last July 21, 2000 preventing the SP to enact such ordinance. The Provincial Government is presently taking the necessary steps to resolve this problem.

C.3 Solid Waste Management Project

Gov. Relampagos reported that he, together with the LGUs of Panglao and Dauis and DOT-VII Director Daisylle Koa, was supposed to meet with the City Mayor of Tagbilaran to ensure that the solid waste disposal requirements of Panglao Island will be integrated in the landfill project to be implemented by the City Government. However, the City government is facing a problem at the moment in view of the disapproval by the EMB-DENR of the ECC for the proposed landfill site in Tagbilaran City. In relation to this, Gov. Relampagos inquired if DENR could recommend another landfill site. Dir. Momongan informed the body that Secretary Cerilles, after his last visit to Bohol, immediately instructed DENR-VII to identify alternative sites in the province. DENR-VII geology team has initially identified two prospective sites, Albur and Corner.

D. DOT and Inter-Agency Projects

D.1 PITE Environmental Impact Assessment

Mr. Manny Bate of Seastems, Inc. informed the group that his company is submitting a partial final report which has been improved based on the comments made by DOT, the Provincial Government and the LGUs of Panglao and Dauis. He stressed that such partial submission is being made just to show DOT the direction they are taking to finalize the report. Together with the partial submission is a formal letter containing all reqvests to DOT in relation to the finalization of the study. Seastems is presently exploring ways to improve the final report's readability.

With regard to DOT's final payment for the draft final report, Usec. Pantig informed Mr. Bate that the check is due for preparation the week after this meeting.

D.2 Delineation of PITE Study Area

D.2.1. Per ARED Augustus Momongan of DENR-VII, the delineation survey of the Panglao Island Tourism Estate study area was approved last May 5, 2000.

D.2.2 The following deliverables as specified in the MOA between DOT and DENR will be submitted by DENR-VII to DENR Secretary Antonio Cerilles for official endorsement to DOT Secretary Gemma Cruz-Araneta

1. Maps of the Delineation Survey and Lot Inventory for the Identified Tourism Development Sites on mylar sheets (6 sets)
2. Delineation Survey Report and Proposed Plan (6 sets)
3. Descriptive technical description of PITE
4. Copy of all data and reports in diskette form

DOT-VII has been furnished with an advance copy of the approved delineation outputs.

D.2.3 The delineated PITE study area totals to 2,023 hectares and shall be proclaimed as tourism estate through a presidential proclamation. DENR-VII has prepared the draft proclamation entitled : *"RESERVING A PARCEL OF LAND OF THE PUBLIC DOMAIN PANGLAO WITHIN THE MUNICIPALITIES OF DAUIS AND PANGLAO, ISLAND OF PANGLAO, PROVINCE OF BOHOL, FOR TOURISM ESTATE DEVELOPMENT PURPOSES AND SHALL BE KNOWN AS PANGLAO ISLAND TOURISM ESTATE (PITE)"*, copy of which was provided to all present in the meeting.

D.3 Panglao Craft Village Project

D.3.1 Per RED Momongan, the ECC for the Panglao Craft Village Project was approved last March 6, 2000 and Mayor Bon can already secure a copy of the ECC approval from DENR-VII.

D.3.2 Per Mayor Bon, clearing of the one-hectare project site has been completed. Fencing of the area is on-going using the P50,000 funding provided by the Municipal Government. Loomweaving skills training by DTI is ongoing.

D.3.3 With regard to the additional funding for the construction of the loomweaving center, he is waiting for the release of P200,000 which Gov. Relampagos has committed to provide. It was agreed that the launching of the craft village will be targetted for November 4, 2000 to coincide with the Carlos P. Garcia Day celebration.

D.4 Panglao Review and Development Committee (PRDCOM)

Gov. Relampagos cited that the PRDCOM is presently functioning on a limited basis since there are no applications for development in the PITE area. The Committee plans to conduct a cross visit to either Boracay Island or Samal Island and would appreciate any assistance that the DOT could extend to the members.

Usec Pantig informed the Governor that DOT has assisted the LGUs of Panglao and Dauis by funding the cross visit to Puerto Galera which the two mayors attended. Mayor Bon gave a brief report on said activity. With this, Usec. Pantig stressed that DOT has already come up with its commitment with regard to the training for the LGUs of Panglao Island.

E. Other Matters

E.1 Re-classification of Panglao Island

Per Director Mamongan, even if the Secretary will approve the revised guidelines on the DENR issuance on *"Moratorium on Disposition and Granting of Any Title, Concession, Permit or Lease on All Islands with Areas 50,000 Hectares and Below"*, titling of lands in Panglao Island will still not be possible unless it is re-classified or proclaimed exempted from PP 2152.

DENR-VII has drafted the presidential proclamation entitled "AMENDING PROCLAMATION NO. 2152, DATED DECEMBER 20, 1981 WHICH DECLARED THE ENTIRE PROVINCE OF PALAWAN AND CERTAIN PARCELS OF THE PUBLIC DOMAIN AND/OR PARTS OF THE COUNTRY AS MANGROVE SWAMP FOREST RESERVES, IDENTIFYING AFTER FINAL SURVEY THE BOUNDARIES OF THE ISLAND OF PANGLAO, PROVINCE OF BOHOL AND RESERVING THE SAME AS A PROTECTED AREA PURSUANT TO REPUBLIC ACT NO. 7586 (NIPAS ACT OF 1992) AND SHALL BE KNOWN AS PROTECTED SEASCAPE FOR PANGLAO ISLAND." This proclamation, if approved, will in effect reduce the area covered by PP 2152 in Panglao Island from 8,755 hectares to 365 hectares. DENR-VII is presently waiting for the other minor documents to support the draft proclamation before submission to DENR-OSEC.

E.2 Investment Promotion

Mayor Bon reported on the available areas for investment in the Municipality of Panglao which are the areas specified in the Tourism Development Plan for PITE.

E : TOR for the Formulation of a Tourism Master Plan for Panglao Island

Since the tourism master plan for the PITE covers only the 2000-hectare PITE study area, Gov. Relampagos is planning for the preparation of a tourism master plan for the entire Panglao Island. DOT shall provide technical assistance in the preparation of the Terms of Reference (TOR) for the formulation of the said plan. Gov. Relampagos suggested that DOT meet with Mr. de Dios of CVPDCC re the preparation of the TOR which will eventually be passed on to the body which will conduct the bidding process for hiring of consultants.

E.4 **Schedule of Regular Task Force Meetings**

The task force will hold regular meetings every two months.

F. **Adjournment**

There being no more matters to be discussed, the meeting was adjourned at 6:45 P.M.

Prepared by:

LILIOSA B. LIBOSADA

Noted by:

ELIZABETH F. NELLE
Director, OPRD

Approved by:

EVELYN B. PANTIG, CESO I
Undersecretary, PPDC

Lily/panglao2000mcMinutes.wpd

Second Scoping Session
For the Proposed Panglao Airport

Date : 18 August 2000
Venue : Panglao Municipal Library & Session Hall

I. ATTENDANCE:

See attached separate sheet

II. PRELIMINARIES:

The session started at 3:15 p.m. and was hosted by Mr. Jovencia Asilo, Municipal Planning Development Officer of Panglao. Participants from the local sector was represented by no less than the Hon. Gov. R. Relampagos, Vice Mayor B.H. Alcala of Panglao and several members of the Panglao Municipal Council.

Representative from the Provincial Environmental and Natural Resources office (PENRO) was also present.

III. HIGHLIGHTS OF THE 2ND SCOPING SESSION:

- Engr. Marcelo B. Delfin, Jr. of TCGI Engineer, the Consulting firm, commissioned by the Central Visayas Project Development Coordinating Committee (CVPDCC) to undertake the feasibility study for the Panglao Airport briefly discussed the general perspective of the proposal on how it was conceptualized. He further discussed the following topics:

    1. Project Location
    2. Evaluation of Existing Tagbilaran Airport
    3. Evaluation of Alternative Sites (Dauis and Panglao Sites)
    4. Proposed Structure and Feasibility Layout

- He stressed that the proposed airport development is of international standard, capable to accommodate larger aircrafts such as B737's and A300's.

- Mrs. Annie Sto. Domingo, Environmental Specialist of TCGI Engineers, stressed the importance of the scoping session because this is the first step in the Environmental Impact Assessment (EIA) process such that the stakeholders have the fore knowledge on the project where issues and concern are identified, discussed, clarified and agreed upon by the concerned sectors. She stressed further that these scoping session is a prerequisite to the issuance of Environmental Clearance Certificate.

- Base line air, noise and water quality measurements were conducted on the proposed project sites. The sampling stations were shown on the plan.

- The effect on the Noise Study, air and water pollution, which occurs during construction and airport operation period as she stressed has less impact on the residents living nearby on the proposed site.

- There are no significant relocation to be undertaken in the proposed sites. The proposed project will contribute to the socio-economic development in the region resulting to the increase of investors coming in and improve the people's way of living.

- At this point, Mrs. Sto. Domingo informed that at present, the Consultant is in the process of preparing the EIS which will be submitted to the DENR for approval.

- Ms. Lina Diona, Sociologist of TCGI Engineers presented the result of the perception survey as part of the preparation of EIA for the Panglao Airport project. The objectives are:

    1. to generate opinion and attitudes regarding the project and
    2. to identify the stakeholder involvement in the project.

- She stressed that based on the results of the survey conducted, the people of Bohol province supports the project.

At this juncture, Gov. R. Relampagos of Bohol, gave emphasis on the importance of an airport for the development of the region. As the existing Tagbilaran Airport can no longer accommodate bigger aircrafts such as B737's and A300's due to a number of technical restrictions, hence the need of relocation based on the assessment made by the Consultant. He ended his talk to ask the cooperation of the stakeholders and to express their views and comments.

Vice Mayor Benedicto H. Alcala thanked the participants who attended the session.

IV. OPEN FORUM

- Vice Mayor B.H. Alcala requested that a third scoping session be held since the lot owners and beach operators affected by the airport development were not properly represented. Further, the Vice Mayor wanted to clarify why the direction/alignment of the proposed airport at Dauis differ from the two other proposed sites.

- Mr. Ferrolino, of TCGI Engineers explained that alignment/direction of an airport always follow the prevailing wind direction. The Consultant also agreed that a 3rd Scoping Session be held to be proceeded by an information drive on directly affected residents and sectors.

- Issues raised by stakeholders and residents of the selected site (Panglao) ranges from fears of plane crash, dislocation, loss of income source, and the popular indifference brought about by delays in the implementation of the project.

- This impression was allayed by Gov. Relampagos, citing that as for the preparation of the Feasibility Study of the airport project, the job being undertaken by the Consultant is the first and only study being done. The one which U.P. Planades undertook, was a Pre-Feasibility Study of Panglao Airport, and does not in particular, define its economic and financial viability, nor consistent with the requirements of NEDA-ICC and the proposed Funding Agency.

V. ADJOURNMENT

There being no other matters to discuss, the scoping session was adjourned at 5:00 p.m.

Prepared by:

MARCELO B. DELFIN, JR.
Deputy Project Manager

Approved by:

LUIS I. MALLONGA
AVP/Project Director

Minutes of the Third Formal Scoping Session
For the Proposed Panglao Airport Project

Date : 14 September 2000
Venue : Panglao Parish Church

I. ATTENDANCE:

See attached separate sheet

II. PRELIMINARIES:

The third formal scoping session started at 2:00 p.m. with Kagawad Saturnina L. Hernando as the program host/emcee. This was after a prayer invocation by a CVPDCC staff.

This gathering was held specifically for the landowners, tenants, residents and resort operators directly affected by the airport project development.

The weak interactions of the participants during the 2nd scoping session and low attendance by affected residents/landowners on the expansion of the airport development plan (272 has. against the 132 has. as originally planned) prompted the conduct of a 3rd scoping session.

Kagawad Hernando introduced all the participants from the local Government Units: Gov. Rene Relampagaos, Mayor Toribio Bon, Vice Mayor Benedicto Alacala and his Councilmen, other local officials from Brgy. Bolod, Tawala and Lourdes, Barangay Residents, the Non-government, Beach Resort Operators and the Parish Priest of Panglao Municipality.

OIC Director C. Ajero delivered the welcome address, re0emphasizing altogether the significance of pursuing the airport project in Panglao.

III. MATTERS DISCUSSED:

A brief description of the project was discussed by Engr. Marcelo B. Delfin, Jr. of TCGI Engineers. Among the topics (technical aspects) discussed for the airport development were the following:

1. Project Location
2. Evaluation of Existing Tagbilaran Airport
3. Evaluation of Alternative Sites (Dauis and Panglao Sites)
4. Layout plans of the proposed airport sites.

The study area has three (3) alternative sites, these are:

a. Alternative I – located in Brgys. Bolod and Tawala, Panglao Municipality.
b. Alternative II – located in Dauis Municipality covering barangays Bingag, Tabalong and Tinago

c. Alternative III – upgrading of the existing Tagbilaran Airport of an International standard.

Mrs. Annie Sto. Domingo, Environmental Specialist of TCGI Engineers informed that the first scoping session for Panglao Airport project was conducted at DENR-EMB office in Cebu City attended by Regional Director Alen C. Arranquez and the CVDP staff while the 2nd scoping session was held in Panglao Library and Seminar Hall in Panglao last August 18, 2000. As mentioned during the previous sessions, the participants were informed that the scoping session being held is the first step in the Environmental Impact Assessment (EIA) process and in order for the stakeholders to have the full knowledge on the project where issues and concern are identified, discussed, clarified, and agreed upon by the concerned sectors.

Also discussed were the Air Noise and Water Quality Measurements conducted on the proposed project sites. Based on the study, the effect on the Noise, Air and Water pollution during construction and airport operation will have less impact on the residents located nearby the proposed airport development area.

She stressed the need during the airport operation for the wastewater to be treated in a Sewage Treatment Plant (STP) before it is discharge.

The participants were informed that at present, the Consultant is in the process of preparing the EIS, which will be submitted, to the DENR for approval.

Miss Lina A. Diona, Sociologist of TCGI Engineers explained that as part of the preparation of the EIA for Panglao Airport Project, the perception survey is required to determine the social acceptability of the Boholanos on the Central Visayas Airport Project considering the following aspects:

a. Economy
b. Migration
c. Community Facilities
d. Services or Institutions
e. Historical Values
f. Land Use
g. Peace and Order

Total sample sizes of 1,200 household respondents from the target barangays were interviewed. This sample is only about 16% of the total number households of the two municipalities (7,643), which were chosen purposively for this study.

Miss Diona, informed the participants that based on the initial results of the survey conducted, it showed that the people of Bohol, generally supports the project.

A follow-up survey was re-conducted by the Consultant a week prior to the 3rd scoping specifically for the stakeholders in Panglao, to harness overall awareness and address perceived objections of the project by the residents of Brgy. Tawala. The Brgy. Captain of Tawala, expressed serious concern on the acceptability of the project in behalf of his constituents, considering that most (80%) of the residents shall be displaced.

The Consultant informed the Brgy. Chairman that the airport layout has been revised and eventually will resolve the concerns being raised. This will be discussed in the Scoping Session.

IV. OPEN FORUM

Gov. Relampagos delivered a brief message, focusing on the cooperation from the residents of Panglao to support the project, prior to start of the Q and A portion;

1. Vice Mayor Alcala asked the people of Brgy. Tawala to answer "yes" or "no" on their position for the proposed project.

   The residents were hesitant to react to the question and was later prevailed by the Governor, by re-phrasing the question, "How do you perceive the project and if you do not want the airport to be in Brgy. Tawala, why?

   Among the main concerns raised were:

   - *Displacement and Dislocation*

     A revised airport layout was shown by the Consultant, indicating minimal houses / residential buildings and other improvements to be affected. Residents were allowed to closely pore in the layout.

     Subsequent explanations regarding the revised layout gave some degree of relief to the affected residents.

- *Land Swapping*

  A certain resident asked if the Government can simply replace the area, he will be giving up (purchased),with the same land in other part of Panglao.

  Gov. Relampagos assured this will be looked into.

- *Purchase Price*

  Residents complained the low purchase price assessed by the government on land, which it normally acquires. The Governor was requested to assist them on this area, to have a reasonable price for the areas they will giving to the government. The Governor shall leave the matter to a committee, which will be created to handle the ROWA.

- *Employment*

  One tri-cycle driver hailed the project as a boost to their income, as more passengers/traffic will be catered.

  Local qualified residents will be given priority during the opening of airport operations. This is reflected in the local Government Code, the Governor assured the people of Panglao.

- *Land Titling*

  Some residents asked Gov. Relampagos if areas, which they have been tilling, and laying claim for several generations could be titled already. The Governor informed them that the law declaring most of Panglao Island as a protected zone remains the same, and needs a repealing decree before individual lots can be titled.

  As there were no other questions raised, Gov. Relampagos reiterated his appeal to the people of Panglao, and think of the premiums that the airport project will deliver. The Brgy. Chairman of Tawala, expressed optimism that as a result of the 3rd scoping session, almost all concerns raised by his constituents were practically resolve. The same sentiment was expressed by Mayor Bon of Panglao.

Gov. Relampagos asked the Consultant to firm up the revised layout of the proposed Panglao Airport.

V. ADJOURNMENT

The Scoping Session was adjourned at around 5:45 p.m.

Prepared by:

MARCELO B. DELFIN, JR.
Deputy Project Manager

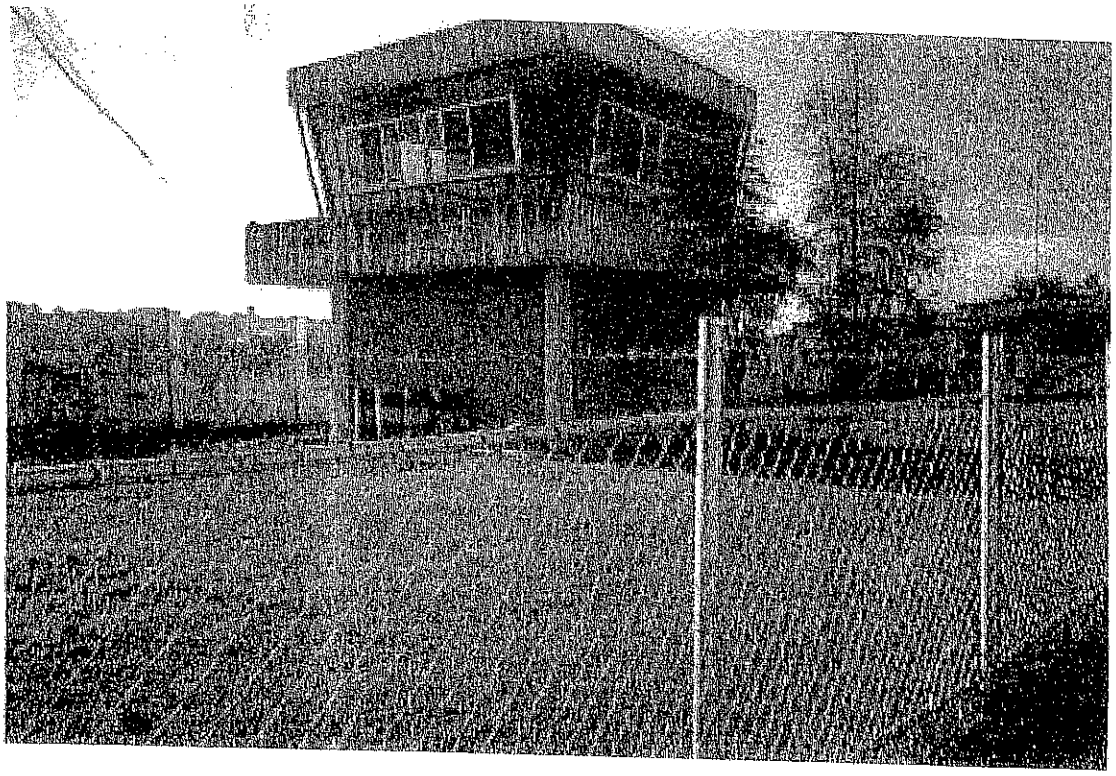
Approved by:

LUIS I. MALLONGA
AVP/Project Director

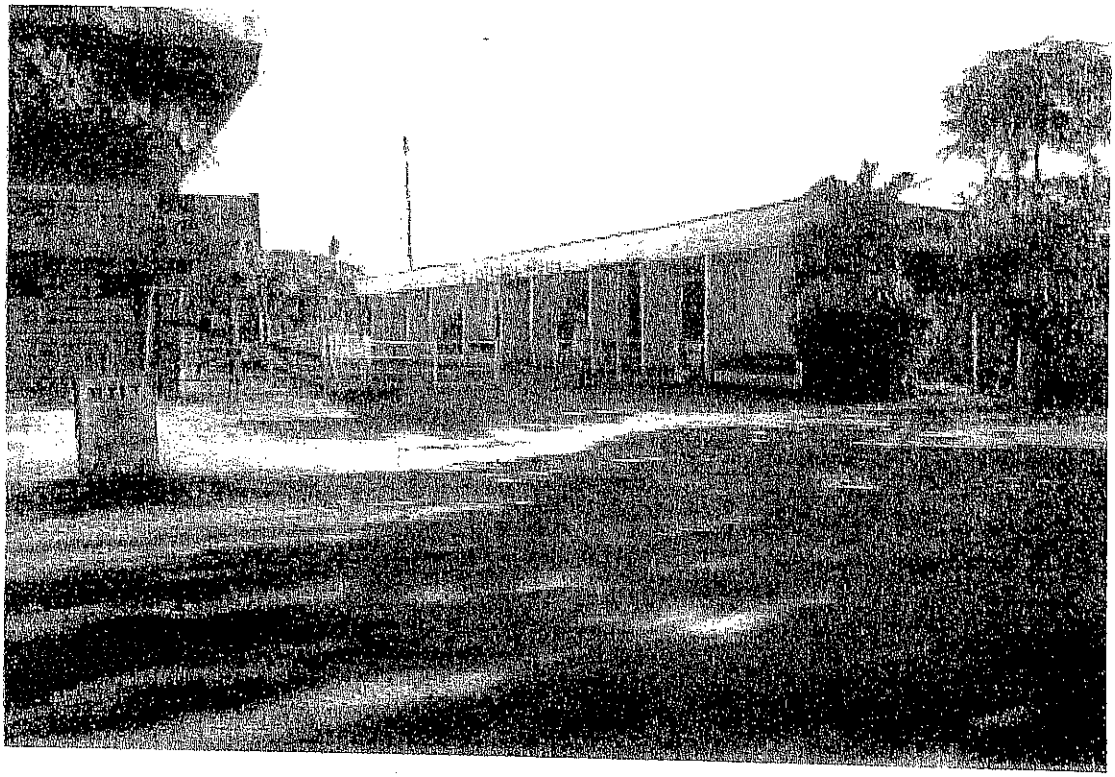
Proposed Airport Site at Brgy. Tabalong, Dauis Municipality
(Alternative No. 2)

Existing Control Tower

On-Going Construction of Passenger Terminal Building



Old Control Tower Building of
Tagbilaran Airport



Landside of Tagbilaran Airport
Old Terminal Building

APPENDIX VI

SUMMARY MATRIX OF ENVIRONMENTAL MANAGEMENT PLAN

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
Environmental Impact Assessment

Environmental Management Plan (EMP)
Panglao Airport, Panglao Island, Bohol

Project Phases and Activities	Impact Description per parameter	Mitigation/ Enhancement Program	Cost of Mitigation or Enhancement Program	Institutional Plan	Schedule	Guarantees
A. Construction Period						
1. Construction Activities	Physical Land subsidence / Alteration of natural drainage pattern	Setting up the necessary structural support foundations and adequate drainage channels/use of interceptor dikes, pipe slope drains, sediment trap	~ ₱ .20 M	Contractor	During the entire period of area development	Included in the scope of Work of Contractor
	Soil contamination due to oil/fuel spill	Close supervision during construction; provision of secondary containment and lining to fuel and oil storage areas	~ ₱ .20 M	Contractor	During the entire period of area development	Included in the scope of Work of Contractor
	Vehicular traffic	Designation of traffic officer, proper scheduling of materials delivery.	Minimal Cost	Contractor		Included in the Contract issued to the Contractor
	Noise Pollution	Appropriate planning of construction schedule	Minimal Cost	Contractor	Construction Phase	"
	Dust Pollution; emissions from construction equipment	Regular sprinkling of water to minimize dust generation and dispersion	~ ₱ 0.20 M	Contractor	During the entire period of area development	Included in the scope of Work of the Contractor
	Biological Loss of Vegetation/Fish and wildlife disturbance	Selective removal of vegetation cover; re-greening of project site	~ ₱ 0.20 M	Contractor	Construction/operation phase	Included in the scope of Work of the Contractor

Project Phases and Activities	Impact Description per parameter	Mitigation/ Enhancement Program	Cost of Mitigation or Enhancement Program	Institutional Plan	Schedule	Guarantees
B. Operation Period						
1. Wastewater Generation	Discharge of the untreated wastewater that may cause nuisance or produce foul odor & groundwater contamination	Treatment of generated waste water to meet the DENR Effluent Standards	> ₱ 0.50 M	Proponent	Operation phase of the project	Considered in the Master Plan and Feasibility Study of the project.
2. Solid Waste Generation	Uncollected, not properly disposed of solid wastes cause sanitation problems and aesthetics of the area	Regular solid wastes collection and disposal by solid waste collectors operating in the area.	> ₱ 0.30 M/year	Proponent and the private solid waste collectors	During the operation phase of the project	Considered in the Master Plan for the project
3. Noise Pollution	Expected during landing and takeoff of aircraft	Provision of noise control structures; relocation of affected households	> ₱ 0.30 M	Proponent/Boh ol Govt.	Operation phase	Considered in the Feasibility study of the project
4. Employment/Source of Livelihood	Socio-Economic The operation will generate source of livelihood and employment particularly to displaced families in the project site	Priority for employment be given to the residents	Depending on the position or nature of work of the hired employees	Proponent/ Airport Operator/ Local Government	Operation phase of the project	Included in the MOA between Proponent and the individual occupants/Common Users

APPENDIX VII

ACCOUNTABILITY STATEMENT OF PROJECT PROPONENT

Republic of the Philippines
CENTRAL VISAYAS PROJECTS DEVELOPMENT COORDINATING COMMITTEE
3rd Floor, Cebu Liok Kui Bldg., No 6 Humabon Avenue,
North Reclamation Area Cebu City 6000 Philippines
Tel. No (63-32)233-64-56; 32-233-64-58; Fax: (63-32) 32-233-64-58

ACCOUNTABILITY STATEMENT OF THE PROJECT PROPONENT

This is to certify that all data/information contained in the Environmental Impact Study (EIS) of the proposed Panglao Airport located at Panglao, Bohol, are accurate and complete. Should we learn of any information which would make the enclosed EIS inaccurate and incomplete, we shall bring said information to the attention of the Environmental Management and Protected Area Sector of the DENR-Regional Office.

We hereby bind ourselves jointly and solidarity with the EIS Preparer for any penalty arising from any misrepresentations or failure to state material information in the EIS.

In witness whereof, we hereby set our hands this _____ day of _____ at _____.

CRESCENCIO M. ROCAMORA
Proponent

SUBSCRIBED AND SWORN to before me this _____ day of _____, 2001, affiant exhibiting to me their Community Tax Certificate, date and place of issuance.

Doc. No. _____
Page No. _____
Book No. _____
Series of 2001

APPENDIX VIII

BARANGAY CERTIFICATION

Republic of the Philippines
Municipality of Panglao

OFFICE OF THE MAYOR

CERTIFICATION FROM THE LOCAL GOVERNMENT UNIT

This is to certify that the undersigned has understood the implications of the proposed Panglao Airport Project located in Brgys. Bolod,Tawala, and Danao, Municipality of Panglao. Further, I certify that I have consulted my respective constituents and they interpose no objection whatsoever against the project. We recommend its operation because it will provide employment and upliftment of the living conditions in our community.

Done this 7th day of Feb., 2001 at Panglao, Bohol.

TORIBIO L. BON
Municipal Mayor

Subscribed and sworn to before me this _____ day of _____ at _____, affiant exhibiting to me his Community Tax Certificate No. 12624928 issued at Panglao, Bohol on Jan 2, 2001.

DOC. NO. 19
PAGE NO. 63
BOOK NO. IV
SERIES OF 2001

ATTY. OSCAR B. GLOVASA
NOTARY PUBLIC UNTIL 12/31/2002
TAGBILARAN CITY, BOHOL PROVINCE
IBP LIFE No. 01844 12/29/98
TIN 118-654-331 12/7/91
PTR No. 1826251 1/15/01

CERTIFICATION FROM THE LOCAL GOVERNMENT UNIT

This is to certify that the undersigned has understood the implication of the proposed **Panglao Airport Project** located in a portion of Brgy. Tawala, Municipality of Panglao. Further, I certify that I have consulted my respective constituents and they interpose no objection whatsoever against the project. We recommend its operation because it will provide employment and upliftment of the living conditions in our community.

Done this 7th day of Feb. 2001 at Municipality of Panglao.

RANULFO L. MILALLOS
Brgy. Captain

SUBSCRIBED AND SWORN to before me this ____ day of FEB 07 2001, 2001, at Municipality of Panglao, affiant exhibiting to me his Residence Certificate No. 03407766 at Panglao Municipality.

1/3/01

Notary Public

ATTY. OSCAR B. GLOVASA
NOTARY PUBLIC UNTIL 12/31/2002
TAGBILARAN CITY, BOHOL PROVINCE
IBP LIFE No. 01844 12/29/98
TIN 118-664-391 12/7/91
PTR No. 1826251 1/15/01

Doc. No. 14
Page No. 65
Book No. IV
Series of 2001

CERTIFICATION FROM THE LOCAL GOVERNMENT UNIT

This is to certify that the undersigned has understood the implication of the proposed **Panglao Airport Project** located in a portion of Brgy. Danao, Municipality of Panglao. Further, I certify that I have consulted my respective constituents and they interpose no objection whatsoever against the project. We recommend its operation because it will provide employment and upliftment of the living conditions in our community.

Done this 7th day of Feb. 2001 at Municipality of Panglao.

AVITO ARCAY
Brgy. Captain

SUBSCRIBED AND SWORN to before me this ____ day of FEB 07 2001, 2001, at Municipality of Panglao, affiant exhibiting to me his Residence Certificate No. 15458V at Panglao Municipality.
1/11/01

Notary Public

Doc. No. 16
Page No. 25
Book No. IV
Series of 2001

ATTY. OSCAR B. GLOVASA
NOTARY PUBLIC UNTIL 12/31/2002
TAGBILARAN CITY, BOHOL PROVINCE
IBP LIFE No. 01844 12/29/98
TIN 118-564-391 12/7/91
PTR No. 1826251 1/15/01

CERTIFICATION FROM THE LOCAL GOVERNMENT UNIT

This is to certify that the undersigned has understood the implication of the proposed **Panglao Airport Project** located in a portion of Brgy. Bolod, Municipality of Panglao. Further, I certify that I have consulted my respective constituents and they interpose no objection whatsoever against the project. We recommend its operation because it will provide employment and upliftment of the living conditions in our community.

Done this 7th day of Feb. 2001 at Municipality of Panglao.

ELMINORO MEJIA
Brgy. Captain

SUBSCRIBED AND SWORN to before me this ____ day of FEB 07 2001 2001, at Municipality of Panglao, affiant exhibiting to me his Residence Certificate No. 03447730 at Panglao Municipality.

1/8/01

Notary Public

ATTY. OSCAR B. GLOVASA
NOTARY PUBLIC UNTIL 12/31/2008
TAGBILARAN CITY, BOHOL PROVINCE
IBP LIFE No. 01844 12/29/98
TIN 118-664-391 12/7/91
PTR No. 1826251 1/15/01

Doc. No. 17
Page No. 05
Book No. IV
Series of 2001

APPENDIX IX

RESULTS OF WATER & AIR SAMPLING

1. INTRODUCTION

TCGI ENGINEERS contracted the services of CRL Environmental Corporation to conduct an ambient air quality at Panglao, Bohol. The ambient air quality monitoring with simultaneos daytime noise monitoring involved measurement of 1-hour average sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead (Pb), and total suspended particulates (TSP).

The monitoring was conducted to check the compliance of the proposed airport project area to air quality standards prescribed under the DENR Administrative Order No. 14.

2. AIR QUALITY TEST

2.1 METHODS OF SAMPLING AND ANALYSIS

2.1.1 SAMPLING EQUIPMENT

There were two types of ambient air samplers used, namely: (1) Kimoto Handy Gas Sampler for collecting SO_2 and NO_2 samples, and (2) Staplex High Volume Sampler for Pb and TSP. These samplers were mounted on a tripod and powered by Meralco electricity through external power sources.

2.1.2 SAMPLING METHODOLOGY

The sampling and analysis procedures are prescribed in the Department of Environment and Natural Resources (DENR) air sampling procedures. The methods of sampling and analysis used are Pararosaniline Method for SO_2, Griess-Saltzman Reaction for NO_2, High Volume-Gravimetric method for TSP, and AAS for Pb.

SO_2 samples were collected by impinging air into a 10-ml sodium tetrachloromercurate solution contained in 30-ml impinger. Sampling flow rate was maintained at 0.5 liter per minute for a period of one hour. After sampling, the solutions were transferred to 50-ml close-cap polyethylene bottles, labeled and preserved in cooler for shipment to the laboratory for analysis. Likewise, ambient NO_2 samples were collected by impinging air into a 10-ml azo-dye forming reagent contained in a 30 ml impinger at a flow rate of 0.5 liter per minute for a period of 60 minutes. The color of the samples were allowed to develop after sampling and consequently analyzed using a Mini Spectronic 20. The absorbance of the sample times the NO_2 calibration

factor over that of the total air sampled gives the concentration of NO_2 in ambient air. For TSP, the samples were collected by sucking ambient air into desiccated fiber-glass filter papers. The filter paper samples were desiccated for 24-hours after sampling and the final weight were determined with an analytical balance. The difference between the final weight and the initial weight of the filter papers over that of the standard volume of air sampled gives the concentration of TSP.

2.1.3 SAMPLING LOCATIONS

The five sampling locations specified by TCGI Engineers are (1) Tawala Elementary School, (2) Brgy. Hall of Danao, (3) Municipal Hall of Danao, (4) Brgy. Tawala near National Road, and (5) Bolod International School Intersection.

2.1.4 RESULTS AND DISCUSSION

Ambient air monitoring was conducted 1-hour at five sampling stations. The observed average air concentrations of SO_2, NO_2, Pb, and TSP, ranged from the following limits: not detected, 9.4 to 32.2 ug/Ncm, not detected, and 4.9 to 429.7 ug/Ncm, respectively. All aforementioned parameters except TSP were well within the National Ambient Air Quality Guidelines (NAAQG) prescribed under the DENR Administrative Order No. 14. The DENR standards as per Table 4 of DAO-14 are: 340 ug/Ncm for SO_2, 260 ug/Ncm for NO_2, 20 ug/Ncm for Pb, and 300 ug/Ncm for TSP.

The highest measured TSP was recorded at the Brgy. Hall of Danao at 429.7 ug/Ncm caused by fugitive dust emission brought by the passing vehicles along the rough and dusty road of the area.

Table 1 Observed Ambient Air Concentrations of SO_2, NO_2, Pb, and TSP in Comparison with the DENR NAAQS (in ug/Ncm)

Stn. No.	Location	Date/ Time of Sampling	SO_2 (ug/Ncm)	NO_2 (ug/Ncm)	Pb (ug/Ncm)	TSP (ug/Ncm)
1	Tawala Elementary School	31 July 2000/ 1:15 PM - 2:15 PM	ND	32.2	ND	4.9
2	Brgy. Hall of Danao	31 July 2000/ 3:00 PM - 4:00 PM	ND	22.7	ND	429.7
3	Municipal Hall of Panglao	31 July 2000/ 4:30 PM - 5:30 PM	ND	9.4	ND	32.3
4	Brgy. Tawala near National Road	01 August 2000/ 8:00 AM - 9:00 AM	ND	22.8	ND	5.1
5	Bolod Elementary School Intersection	01 August 2000/ 9:40 AM - 10:40 AM	ND	28.3	ND	10.3
DENR Standard		1 – hr sampling	340	260	20	300

* ND – means Not Detected

3. NOISE LEVEL MONITORING

3.1 Methodology

Noise levels were measured by a Realistic Digital Noise Level Meter. For each sampling location, monitoring was performed one hour each station daytime of July 31 to August 1, 2000. Measurement was done by recording the lowest and highest noise levels recorded at each four-compass direction. The logarithmic average of these noise levels gives the equivalent noise level (Leq).

3.2 Results and Discussion

The observed and equivalent noise levels are presented in *Table 2*. Observations done at all the sampling locations showed wide noise variations caused by vehicular traffic and noise from the car body building and repair shop at the site.

3.3 Summary

The observed and equivalent noise levels showed wide variations caused by vehicular traffic and from car body building & repair shop at the site. The table below shows a summary of the logarithmic average of these noise levels at the five designated stations namely: Tawala Elementary School, Brgy. Hall of Danao, Municipal Hall of Danao, Brgy. Tawala near National Road, and Bolod International School Intersection.

Bolod Int'l. School Intersection experienced noise levels as high as 52.7 db(A) in the daytime but this was within the DENR standard with the +5 db(A) correction factor. This noise level was due to the noise from car body building and repair shop.

Table 2: Summary of Noise Level Measurements at Panglao Bohol

LOCATION	DATE/TIME OF SAMPLING	CATEGORY	Leq	REMARKS
Tawala Elementary School	31 July 2000/ 2:20 PM	Daytime	51.3	Noise from passing vehicles
Brgy. Hall of Danao	31 July 2000/ 4:10 PM	Daytime	50.3	Noise from passing vehicles
Municipal Hall of Danao	31 July 2000/ 5:40 PM	Daytime	50.5	Noise from passing vehicles
Brgy. Tawala near National Road	01 August 2000/ 9:10 AM	Daytime	51.9	Noise from passing vehicles
Bolod Int'l. School Intersection	01 August 2000/ 10:50 AM	Daytime	52.7	Noise from car body building & repair shop

The application of DENR noise level standards depends on the category of the primary land use of the area. As per the National Pollution Control Commission (NPCC) Memorandum Circular No. 002 Series of 1980, a correction factor equivalent to +5 db(A) applies to areas directly facing a two-lane road; thus, the correct standards are 70, 65 and 60 db(A) for daytime, early morning/evening and night-time periods, respectively. *Table 3* presents the Noise Standards in General Areas as per Rules and Regulations of the National Pollution Control Commission (1978), Section 78, Table 1.

NOISE STANDARDS IN GENERAL AREAS

CATEGORY of AREA[1]	DAYTIME[2]	MORNING[3] & EVENING[4]	NIGHT TIME[5]
AA	50 db[6]	45 db	40 db
A	55 db	50 db	45 db
B	65 db	60 db	55 db
C	70 db	65 db	60 db
D	75 db	70 db	65 db

Legend : [1]AA – A section or contiguous area which requires quietness, such as an area within 100 meters from school sites, nursery schools, hospitals and special homes for the aged.

A – A section or contiguous area which is primarily used for the residential purposes.

B – A section or contiguous area which is primarily commercial area.

C – A section primarily reserved as a light heavy industrial area.

D – A section which is primarily reserved as a heavy industrial area.

[2]Daytime : 9:00 AM to 6:00 PM

[3]Morning : 5:00 AM to 9:00 AM

[4]Evening : 6:00 PM to 10:00 PM

[5]Night Time : 10:00 PM to 5:00 AM

[6]db : decibel (unit of measurement of sound)

Source: Rules and Regulations of the National Pollution Control Commission (1978), Section 78, Table 1 – Environmental Quality Standards for Noise in General Areas (maximum allowable noise levels in general areas).

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Lab Fax : (6345) 599-3963
Office Tel . (632) 840-4071
Cellphone . (0917) 892-1171
Office Fax (632) 810-0329

Intertek Testing Services
Labtest

TEST REPORT

APPLICANT: TCGI ENGINEERS PANGLAO AIRPORT PROJECT
6th Floor, Jaka II Bldg., 150 Legaspi Village
1229 Makati City
Attn: **Ms. Annie Sto. Domingo / Mr. Leo L. Carpio**

NUMBER: RW000822 (WT6-2511)

DATE: 09 August 2000

SAMPLE DESCRIPTION:
Two (2) submitted samples (2 liters each, full) said to be ground water marked as:

		(A) GW1	(B) GW2
Owner	:	Leoncio Boncaron	Avito Arcay
Type of Well	:	Open Dug Well	Open Dug Well
Location	:	Airport Site; Brgy. Tawala Panglao, Bohol	20 meters from the road, Brgy. Danao, Panglao, Bohol
Time of Sampling	:	8:35 AM	10:15 AM
Date	:	August 01 2000	August 01 2000
Weather	:	Fair	Fair
Air Temperature	:	30 °C	30 °C
Water Temperature	:	29 °C	29 °C
Containers	:	2 plastic bottles	2 plastic bottles
Depth	:	Approx. 6 meters	4 meters
Dimension	:	Opening - 2m. x 2m. square	---
Below Ground	:	Circular w/ diameter of about 2m.	---
Date of Construction	:		November 1936
Opening	:		2 meters

Date Sample Received: 01 August 2000
Date of Analysis: 02 - 09 August 2000

****

TESTS CONDUCTED: As requested by the Applicant. Refer to page two for details.

****

CHECKED AND APPROVED BY:

MA. ELOISA L. GUEVARA
PRC Lic. No. 7486
mtf/lyv

SIGNED FOR THE COMPANY BY:

LUDIVINO F. MONTANO
General Manager

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Intertek Testing Services
Labtest

TEST REPORT

NUMBER: RW000822 (WT6-2511)

DATE: 09 August 2000

TESTS CONDUCTED:

	PARAMETERS	RESULTS (A)	RESULTS (B)	LIMIT*
WA06-2	CHLORIDE, mg/L (By Argentometric Titration)	164	386	250
WA25-2	TOTAL HARDNESS, $mgCaCO_3/L$ (By EDTA Titration / Calculation)	252	296	300
WA16-2	pH VALUE (By Glass Electrode)	6.99	7.05	6.5 - 8.5
WA24-2	TOTAL DISSOLVED SOLIDS, mg/L (By Drying to Constant Weight at 180°C)	484	956	500
WA20-2	SULFATE, mg/L (By Gravimetric with Drying of Residue)	7	35	250
WA19-2	SILICA, mg/L (By UV/Vis Spectrophotometry)	7.87	8.42	---
WB08-2	IRON, mg/L (By Atomic Absorption Spectrometry)	ND	ND	1
WA10B-2	CALCIUM, mg/L (By Atomic Absorption Spectrometry)	81.70	88.92	---
WA10C-2	MAGNESIUM, mg/L (By Atomic Absorption Spectrometry)	11.56	18.07	---

Remarks:
mg/L = milligram per liter
$mgCaCO_3/L$ = milligram Calcium Carbonate per Liter
--- = no available specification
ND = Not Detected
* = Philippine National Standards for Drinking Water 1993, DOH

Reference: Standard Methods for the Examination of Water and Wastewater, APHA, 19th Ed., 1995

****

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Intertek Testing Services
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TEST REPORT

APPLICANT: TCGI ENGINEERS PANGLAO AIRPORT PROJECT
6th Floor, Jaka II Bldg., 150 Legaspi Village
1229 Makati City
Attn: Ms. Annie Sto. Domingo / Mr. Leo L. Carpio

NUMBER: RW000822-I (WT6-2511-I)

DATE: 09 August 2000

SAMPLE DESCRIPTION:
Two (2) submitted samples (2 liters each, full) said to be ground water marked as:

		(A) GW1	(B) GW2
Owner	:	Leoncio Boncaron	Avito Arcay
Type of Well	:	Open Dug Well	Open Dug Well
Location	:	Airport Site, Brgy. Tawala Panglao, Bohol	20 meters from the road, Brgy. Danao, Panglao, Bohol
Time of Sampling	:	8:35 AM	10:45 AM
Date	:	August 01 2000	August 01 2000
Weather	:	Fair	Fair
Air Temperature	:	30 °C	30 °C
Water Temperature	:	29 °C	29 °C
Containers	:	1 sterilized glass bottle	1 sterilized glass bottle
Depth	:	Approx. 6 meters	4 meters
Dimension	:	Opening -2m. x 2m. square	---
Below Ground	:	Circular w/ diameter of about 2m.	---
Date of Construction	:	---	November 1936

Date Sample Received: 01 August 2000
Date of Analysis: 02 - 08 August 2000

NOTE: Supplementary to Report Number RW000822 (WT6-2511).

****

TESTS CONDUCTED: As requested by the Applicant. Refer to page two for details.

****

CHECKED AND APPROVED BY:

for BENIGNO GLENN R. RICAFORTE
Assistant Manager - Micro Laboratory
/lyv

SIGNED FOR THE COMPANY BY:

LUDIVINO F. MONTANO
General Manager

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TEST REPORT

NUMBER: RW000822-I (WT6-2511-I)

DATE: 09 August 2000

****

CONCLUSION:
The water samples exceeded the limit set for coliform count but are negative for *Escherichia coli.*

****

TESTS CONDUCTED: As requested by the Applicant.

PARAMETER		RESULTS (A)	RESULTS (B)	LIMIT*
WC6A-2	**HETEROTROPHIC PLATE COUNT,** CFU/mL (Pour Plate)	1,100 Est	730 Est	---
WC7A-2	**COLIFORM COUNT,** MPN/100 mL (By Multiple Tube Fermentation Technique)	>16.0	>16.0	<2.2
WC1A-2	***Escherichia coli* DETECTION** (Biochemical Testing)	negative	negative	negative

NOTE: The heterotrophic plate count (HPC) is currently not required for determining water potability (Philippine National Standards for Drinking Water, 1993). However, HPC of greater than 500 CFU/ml may interfere with growth of coliform organisms in culture. That is, if the HPC is >500 CFU/ml, there may be actually more coliform in the sample than reported above (WHO Guidelines for Drinking Water Quality, 1995).

Remarks:
CFU/mL = Colony Forming Unit per milliliter
MPN/100 mL = Most Probable Number per 100 milliLiter
Est = Estimated Count
> = greater than
< = less than
* = Philippine National Standards For Drinking Water, 1993

References:
Standard Methods for the Examination of Water and Wastewater, APHA, 19th Ed, 1995
Philippine National Standards For Drinking Water, 1993

****

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TEST REPORT

APPLICANT: TCGI ENGINEERS PANGLAO AIRPORT PROJECT
6th Floor, Jaka II Bldg., 150 Legaspi Village
1229 Makati City
Attn: **Ms. Annie Sto. Domingo / Mr. Leo L. Carpio**

NUMBER: RE000807 (ET6-2512)

DATE: 09 August 2000

SAMPLE DESCRIPTION:
One (1) submitted sample (1/2 gal and 1 liter) said to be seawater.

Date	:	August 01 2000
Location	:	In front of Alona Kew (100 meters away from the shore) Brgy. Tawala, Panglao, Bohol
Depth	:	4 meters
Time of Sampling	:	10:20 AM
Weather	:	Sunny
Wave	:	Calm, high tide
Water Temperature	:	29 °C
Air Temperature	:	30 °C
Containers	:	1 plastic gallon and 1 glass bottle

Date Sample Received: 01 August 2000
Date of Analysis: 02 - 07 August 2000

****

TESTS CONDUCTED: As requested by the Applicant.

	PARAMETER	RESULT
WA04-1	BIOCHEMICAL OXYGEN DEMAND (BOD_5), mg/L (By Azide Modification Dilution Technique)	19
WA17-1	pH VALUE (By Glass Electrode)	7.48
WA32-1	TOTAL SUSPENDED SOLIDS, mg/L (By Gravimetric, Drying to Constant Weight at 103 - 105°C)	29
WA16-1	OIL AND GREASE, mg/L (By Gravimetric - Petroleum Ether Extraction)	ND

Remarks: mg/L = milligram per Liter
ND = Not Detected

Reference: Standard Methods for the Examination of Water and Wastewater, APHA, 19th Ed., 1995

****

Page 1 of One / End of Report

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SIGNED FOR THE COMPANY BY:

LUDIVINO P. MONTANO
General Manager

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TEST REPORT

APPLICANT: TCGI ENGINEERS PANGLAO AIRPORT PROJECT
6th Floor, Jaka II Bldg., 150 Legaspi Village
1229 Makati City
Attn: **Ms. Annie Sto. Domingo / Mr. Leo L. Carpio**

NUMBER: RE000807-I (ET6-2512-I)

DATE: 09 August 2000

SAMPLE DESCRIPTION:
One (1) submitted sample (approximately 250 mL) said to be seawater.

Date	:	August 01 2000
Location	:	In front of Alona Kew (100 meters away from the shore) Brgy. Tawala, Panglao, Bohol
Depth	:	4 meters
Time of Sampling	:	10:20 AM
Weather	:	Sunny
Wave	:	Calm, high tide
Water Temperature	:	29 °C
Air Temperature	:	30 °C
Containers	:	2 bottles

Date Sample Received: 01 August 2000
Date of Analysis: 02 - 09 August 2000
NOTE: **Supplementary to Report Number RE000807 (ET6-2512).**

****

CONCLUSION:
The seawater sample passed the concluded microbiological tests.

****

TESTS CONDUCTED: As requested by the Applicant.

	PARAMETER	RESULT	LIMIT*
WC7A-1	COLIFORM COUNT, MPN/100 mL (By Multiple Tube Fermentation Technique)	<2	1,000
WC2A-1	FECAL COLIFORM COUNT, MPN/100mL (By Multiple Tube Fermentation Technique)	<2	200

Remarks: MPN/100 mL = Most Probable Number per 100 milliLiter
< = less than
* = Class SB for Recreational Water Class I (Areas regularly used by the public for bathing, swimming, skin diving etc.)

Reference: Standard Methods for the Examination of Water and Wastewater, APHA, 19th Ed, 1995

****

Page 1 of One / End of Report

CHECKED AND APPROVED BY:

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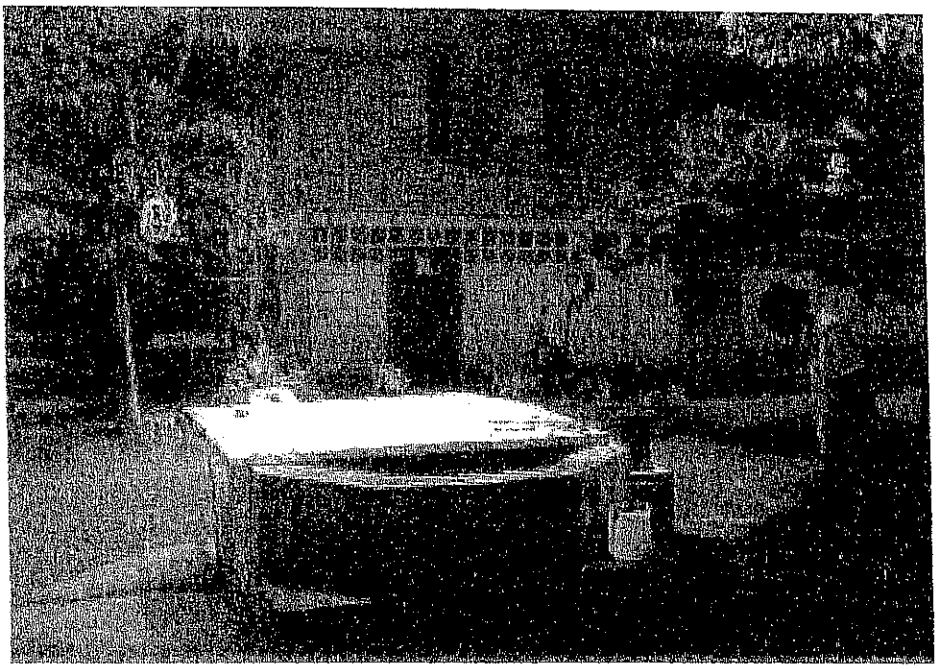
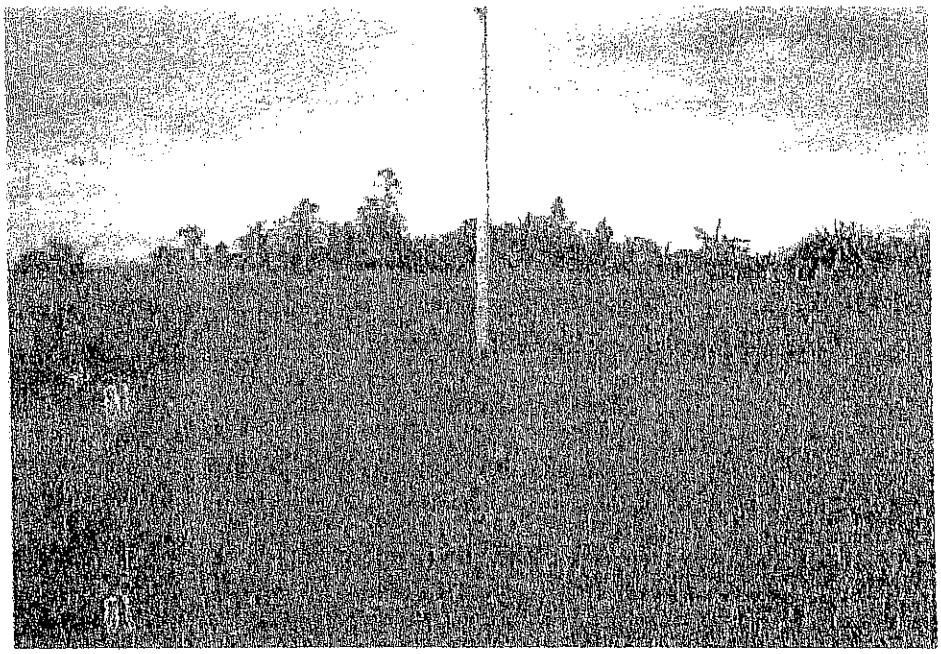
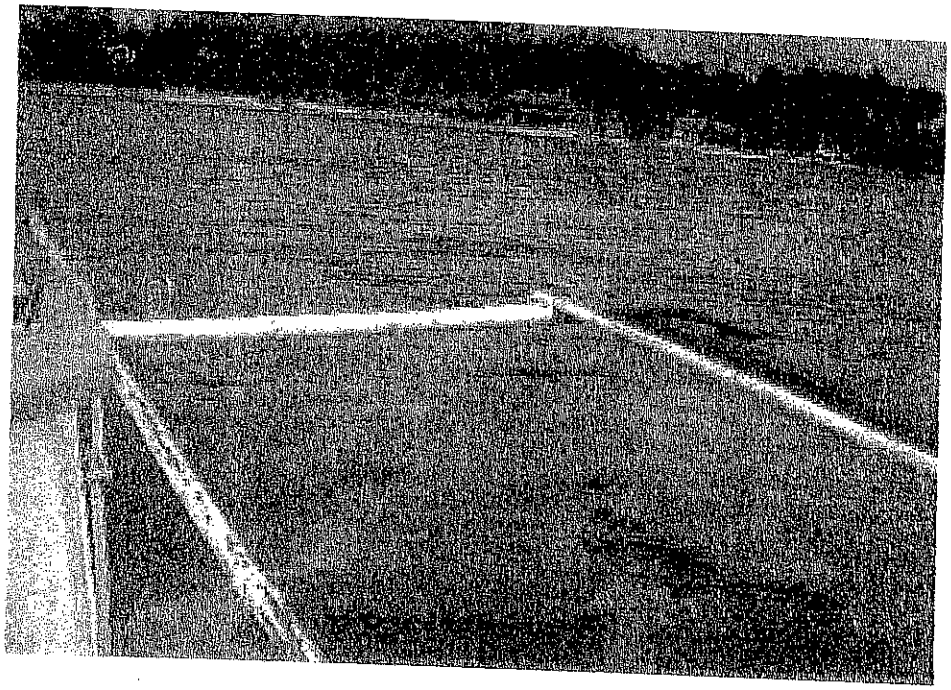


Groundwater Sampling Station 2
Brgy. Danao, Panglao, Bohol
(Owner: Mr. Avito Arcay)

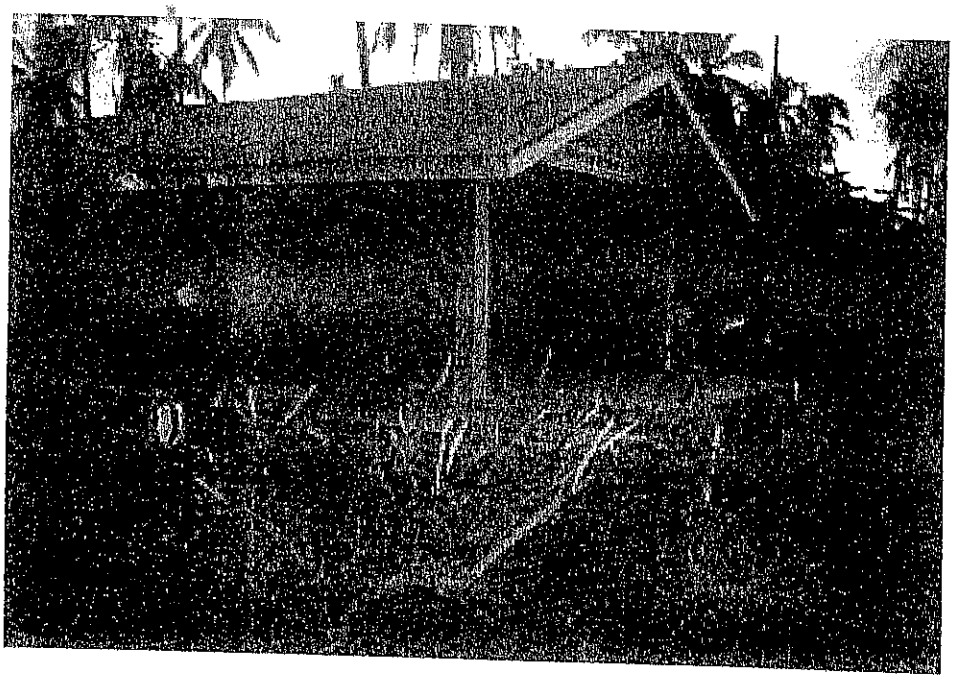


Groundwater Sampling Station 2
Brgy. Tawala, Panglao, Bohol
(Owner: Mr. Leoncio Boncaron)

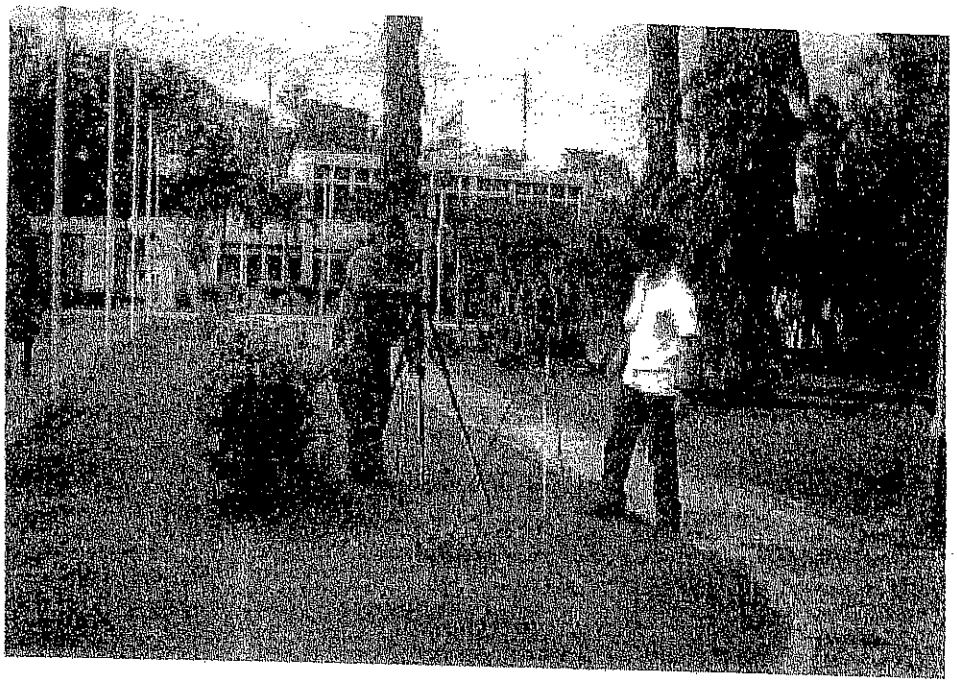


SEAWATER SAMPLING POINT – 100 Meters away from the shore of Alona Key Beach

AIR SAMPLING STATION 1 – Tawala Elementary school
Brgy. Tawala, Panglao, Bohol

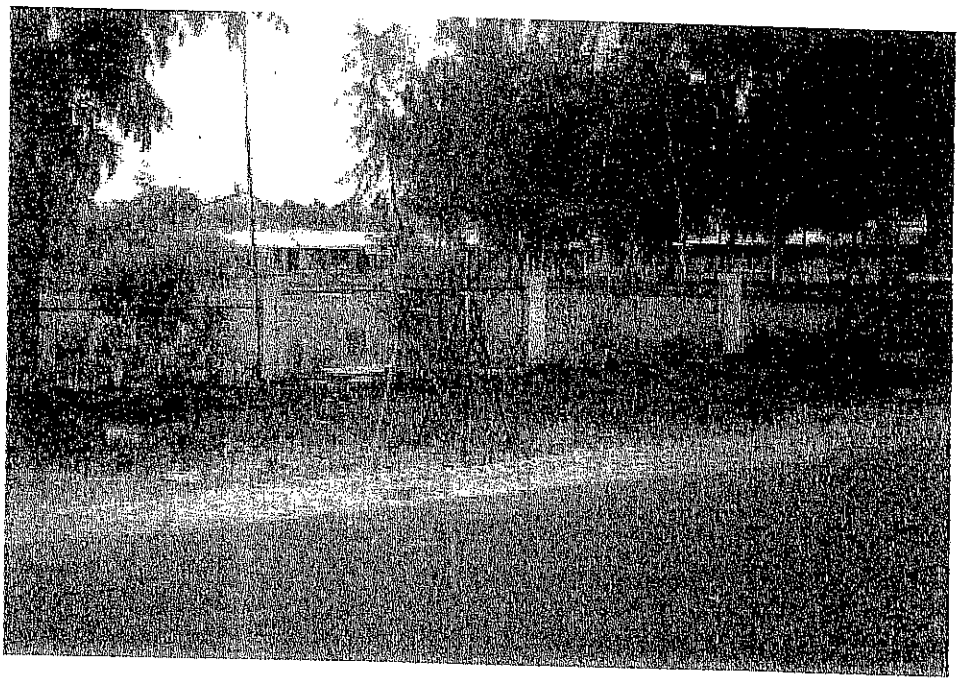


AIR SAMPLING STATION 2 – Danao Barangay Hall
Brgy. Danao, Panglao, Bohol



AIR SAMPLING STATION 3 – Panglao Municipal Hall
Poblacion, Panglao, Bohol

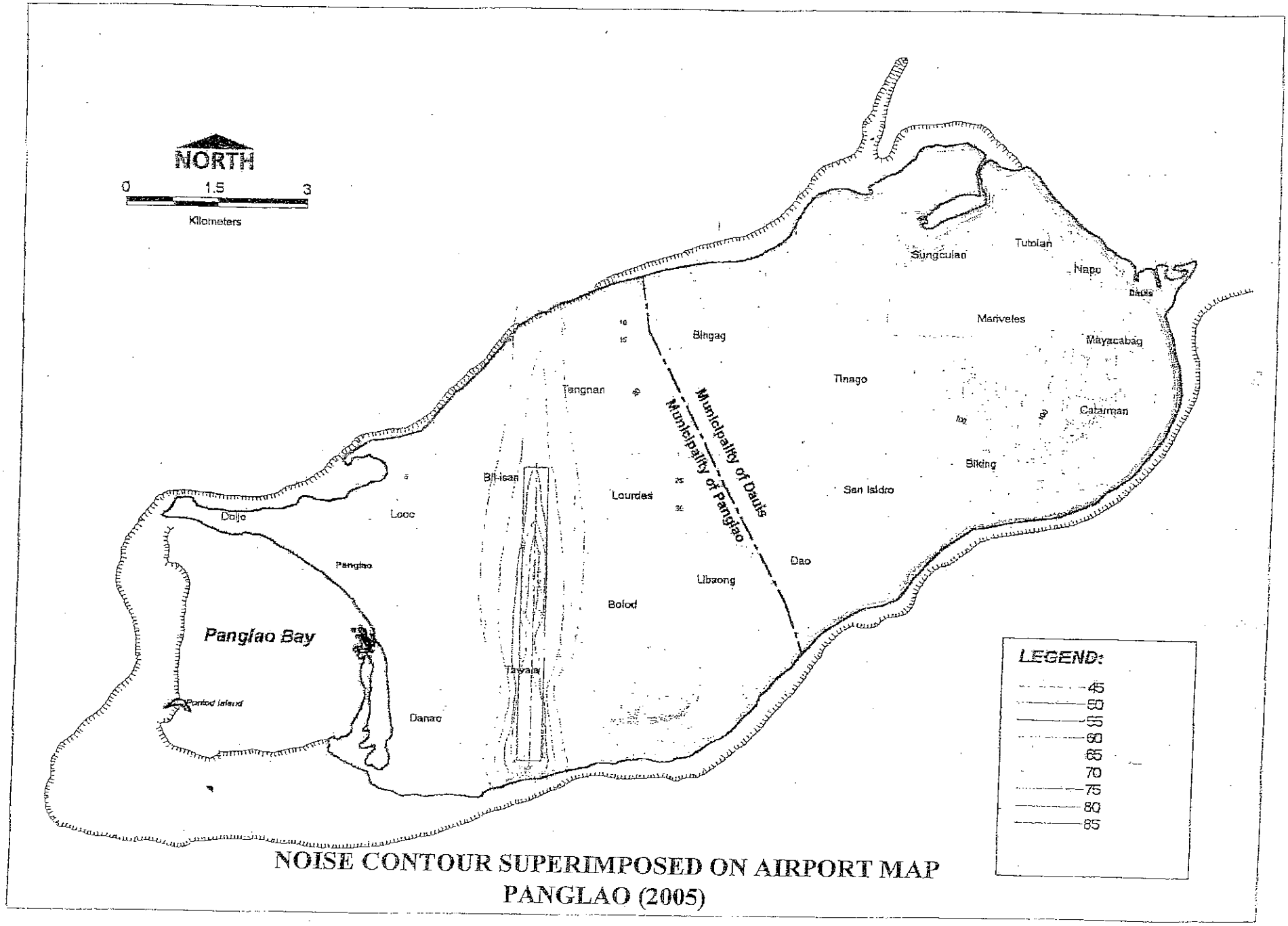
AIR SAMPLING STATION 4 – Access Road to Airport
Brgy. Tawala, Panglao, Bohol



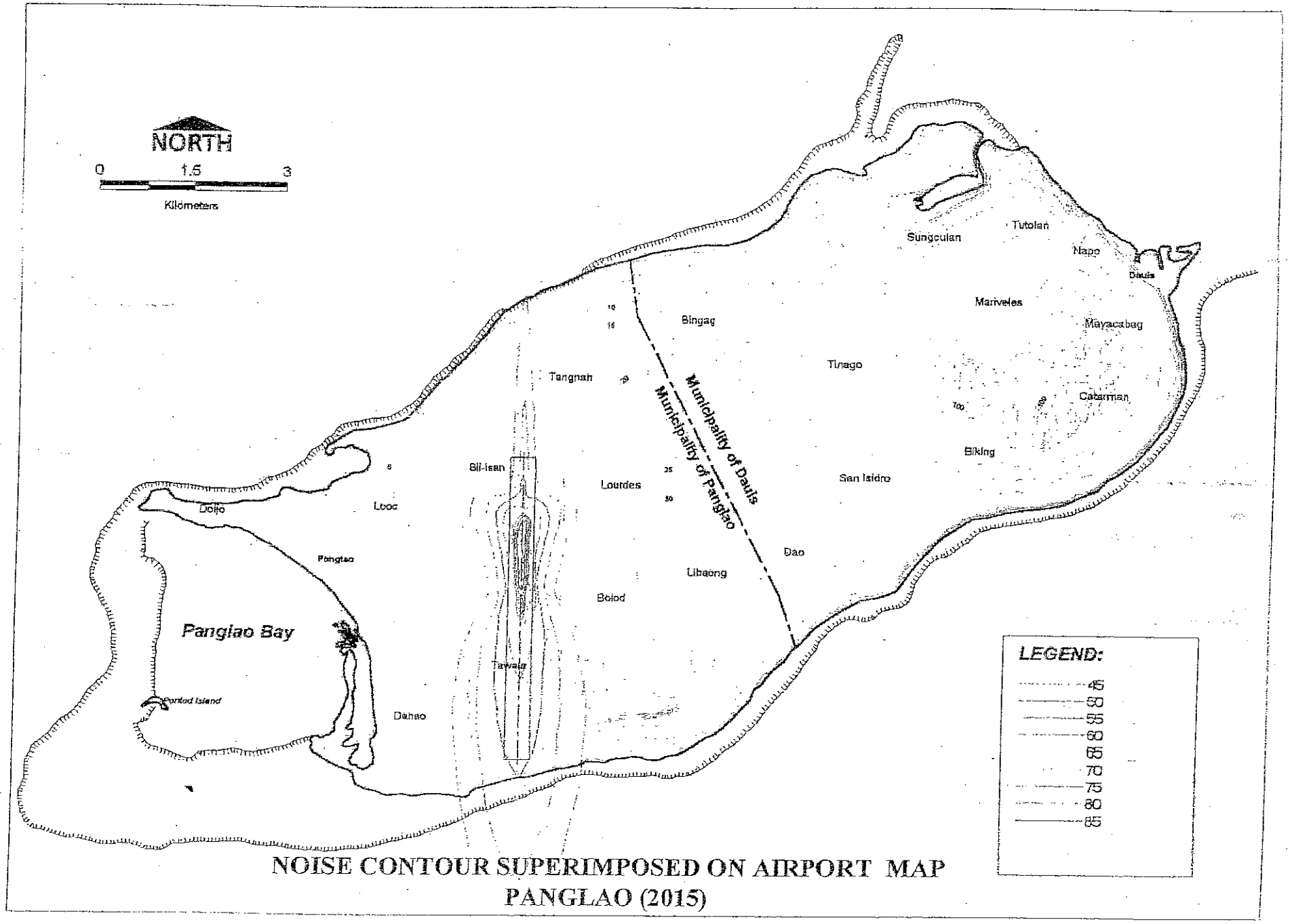
AIR SAMPLING STATION 5 – Bolod Elementary School
Brgy. Bolod Panglao, Bohol

APPENDIX X

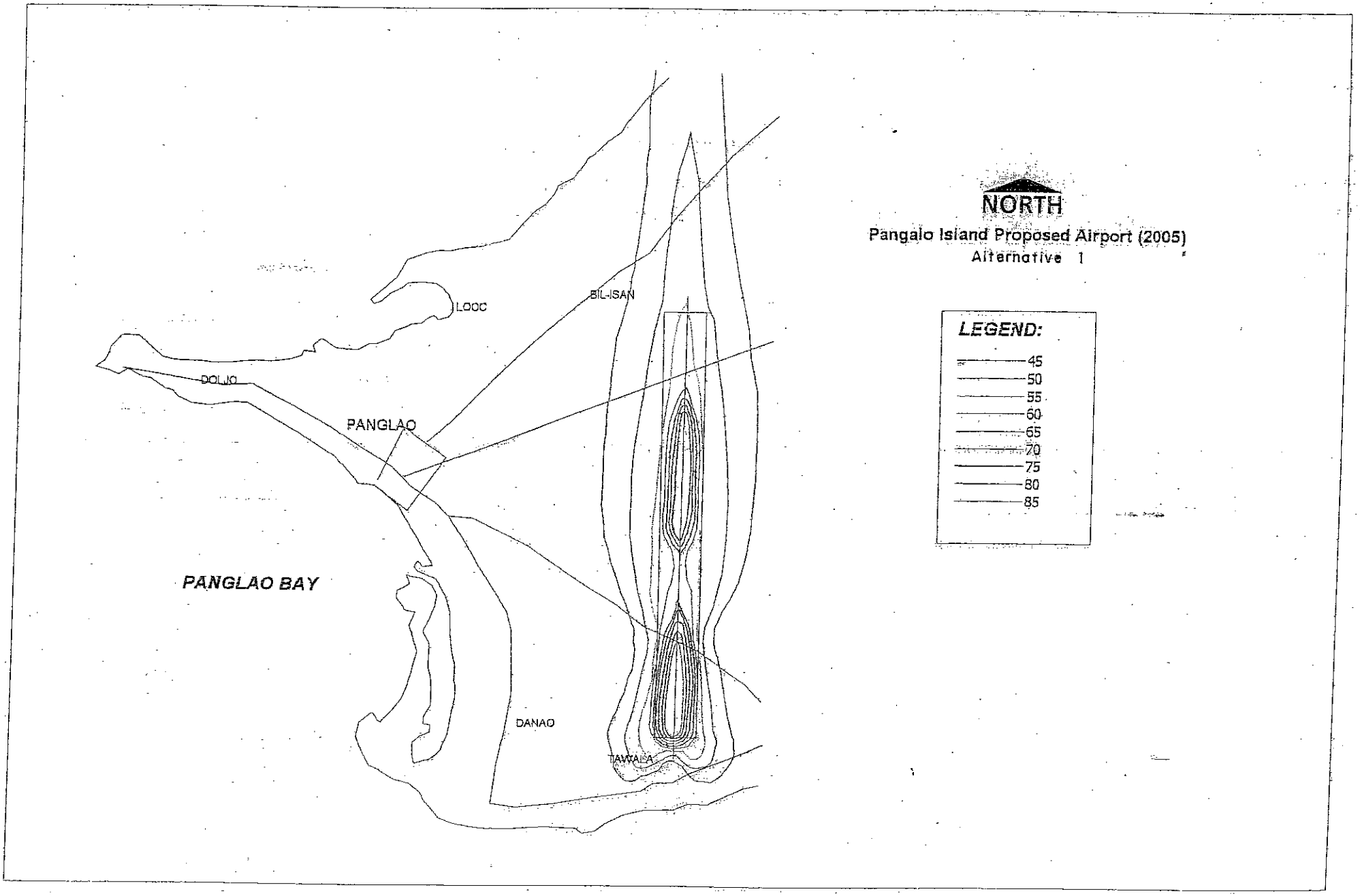
RESULTS OF NOISE MEASUREMENT



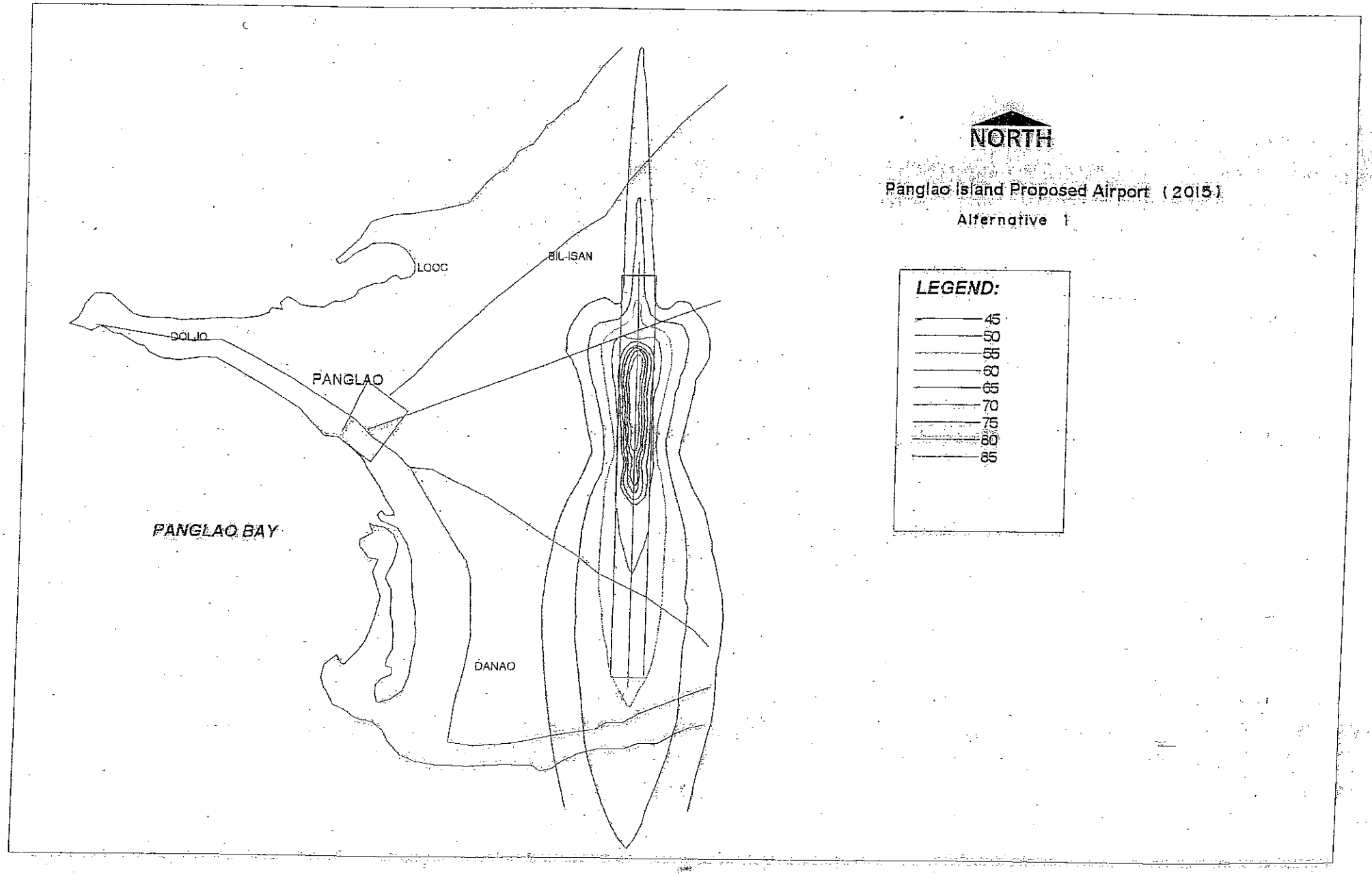
NOISE CONTOUR SUPERIMPOSED ON AIRPORT MAP
PANGLAO (2005)



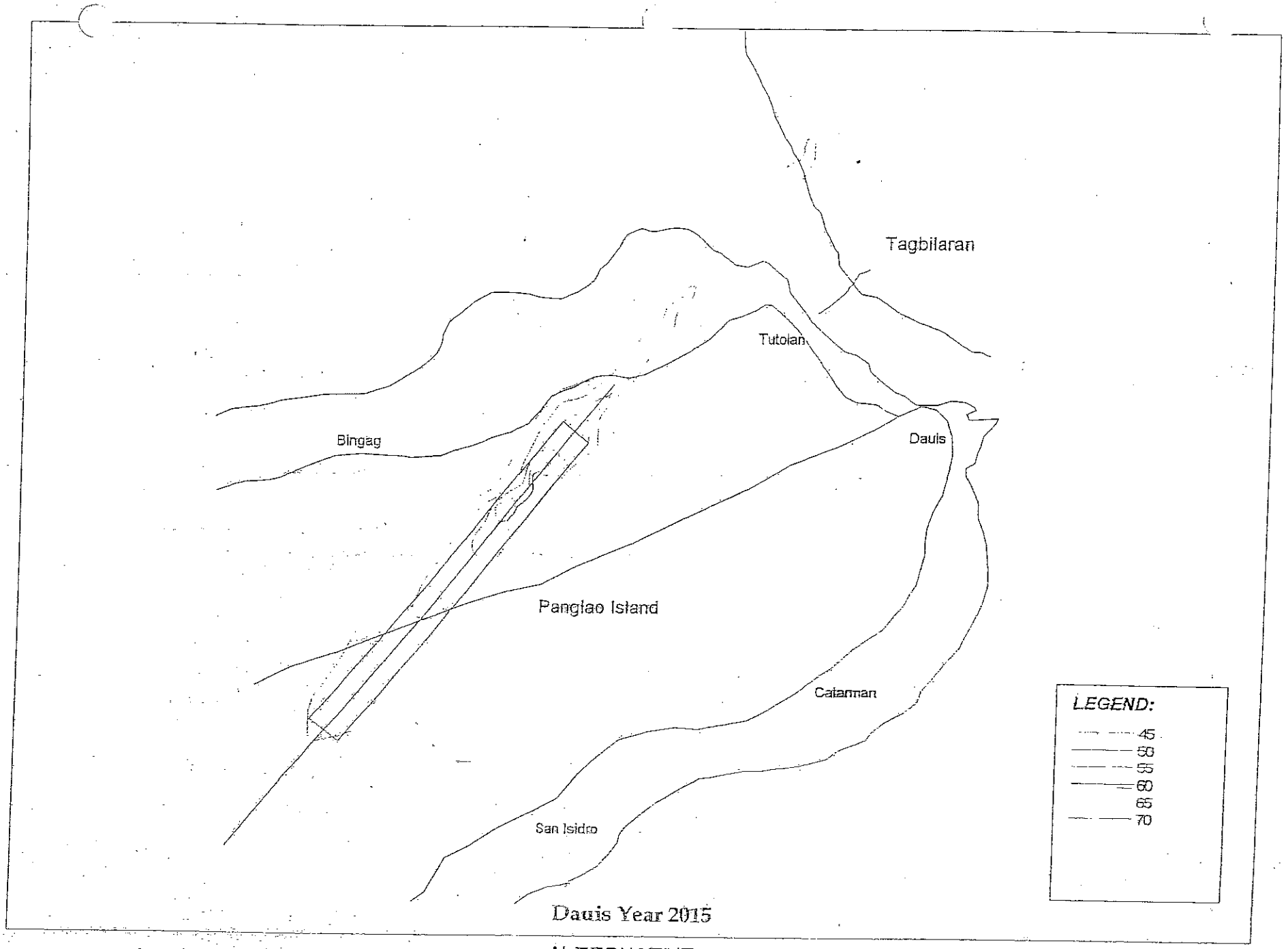
NOISE CONTOUR SUPERIMPOSED ON AIRPORT MAP
PANGLAO (2015)



NOISE CONTOUR LAYOUT PANGLAO (2005)

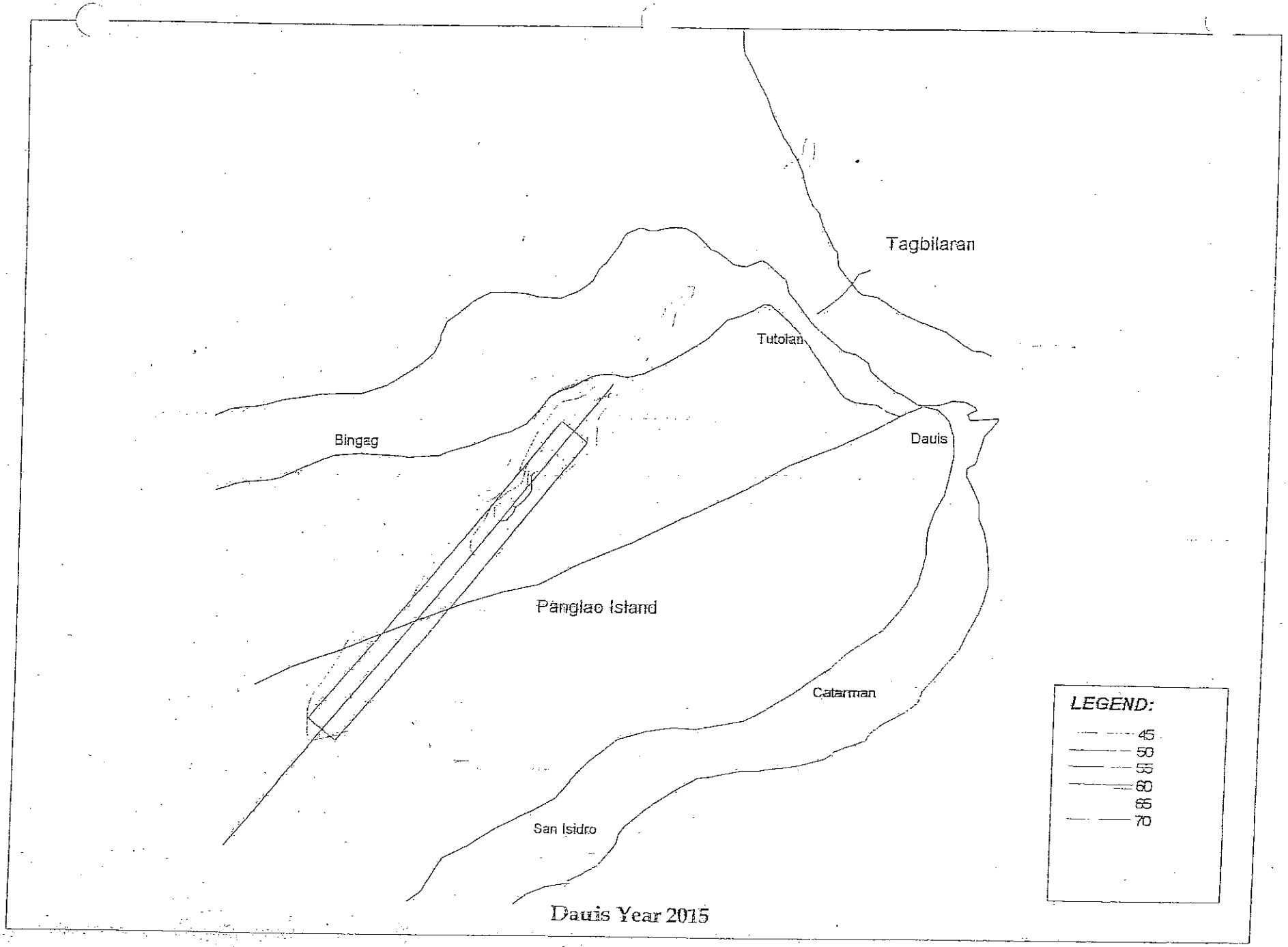


NOISE CONTOUR LAYOUT PANGLAO (2015)



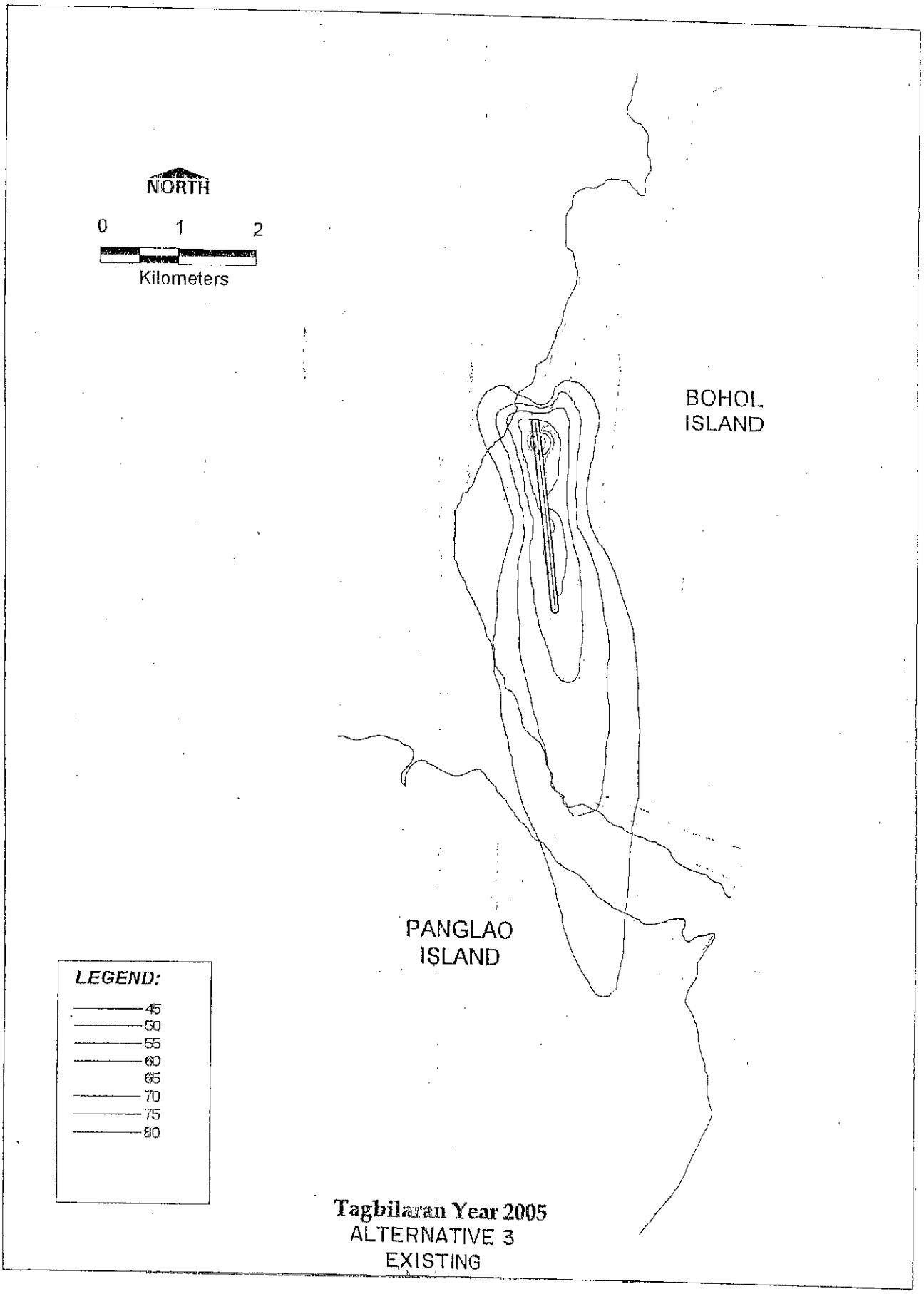
Dauis Year 2015

ALTERNATIVE 2



Dauis Year 2015

ALTERNATIVE 2


NORTH
0 1 2
Kilometers
BOHOL ISLAND
PANGLAO ISLAND
LEGEND:
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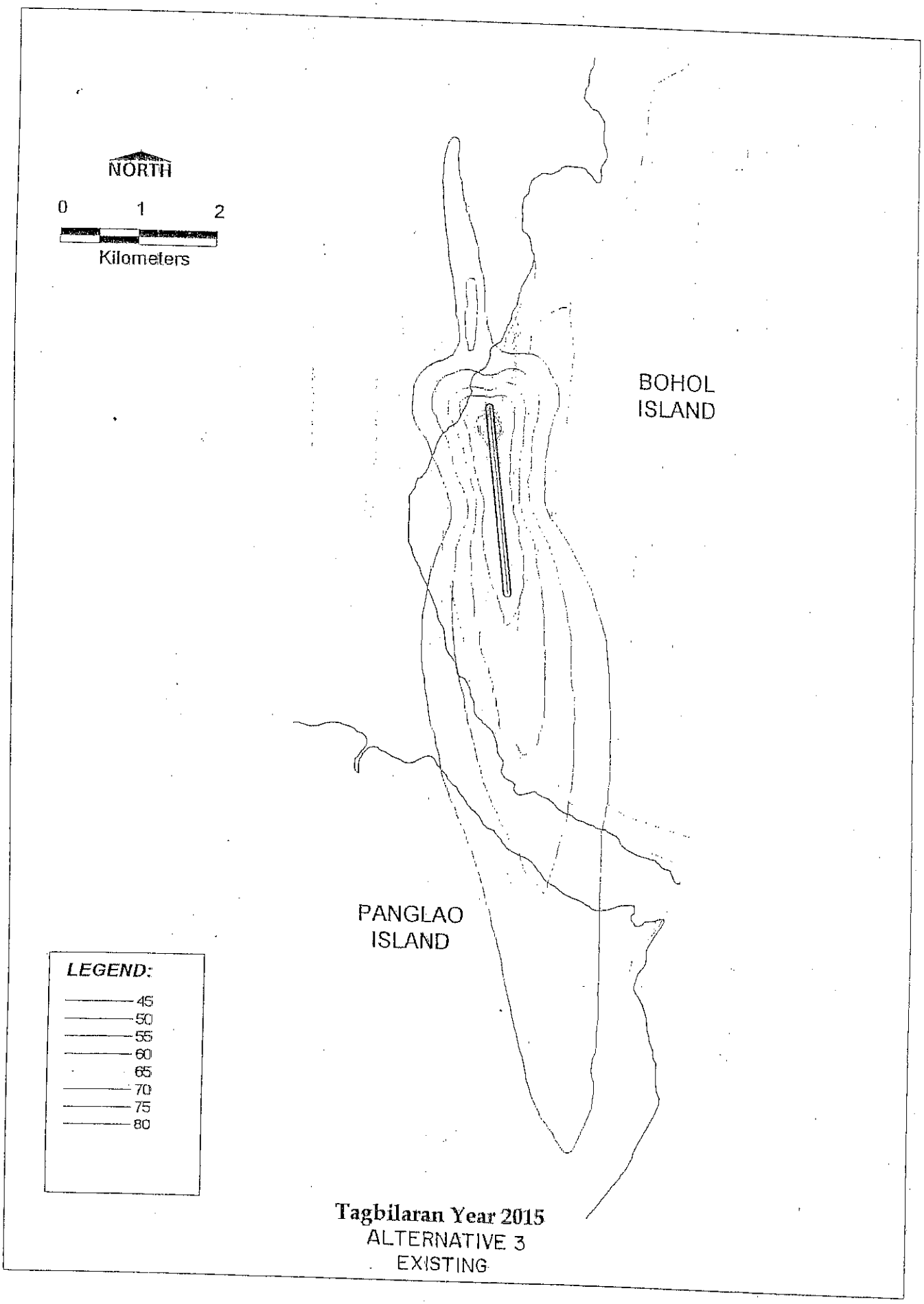
Tagbilaran Year 2005
ALTERNATIVE 3
EXISTING


NORTH
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Tagbilaran Year 2015
ALTERNATIVE 3
EXISTING

Assessment of the Noise Impact Of the Proposed Airport of Panglao Island

1. Introduction

The prediction of the noise impact of the proposed airport of Panglao Island was conducted as part of the feasibility study and environmental impact assessment done by TCGI. The noise impact prediction was done through the use of the United States Fedral Aviation Administration Integrated Noise Model, version 5.1 (USFAA IMN v 5.1). The Integrated Noise Model (INM) has been used by the USFAA since 1978 to assess changes in noise impact resulting from new or extended runways, new traffic demand and fleet mix, revised routing and airspace structures, alternative flight profiles and modifications to other operational procedures. INM version 5.1 is the latest version and it contains the noise signatures of 110 new aircraft models.

The assumptions on flight operations (flight frequency and type of aircrafts) used in the modeling were supplied by TCGI. Prediction of noise model was done for two study periods, Year 2005 and Year 2015. TCGI have identified three alternative airports and noise prediction was made for each of the alternative airport. The noise impact was assessed based on existing Philippine standard for ambient noise.

2. Methods and Procedure

A. Specifications of the airport were provided by TCGI based on preliminary plan. Geographic coordinate of both ends of the runway were measured by TCGI from the NAMRIA 1:50,000 topographic map.
B. The runway and some features, such as road network, shoreline were digitized.
C. The prediction of noise levels was done using the USFAA Integrated Noise Model v. 5.1 (USFAA v5.1). *This is an average value model and is designed to estimate long term average effects using average annual input conditions. Consequently, differences between predicted and measured values can sometimes occur.*
D. The resulting noise contour was exported as CAD file (dxf file).
E. The noise contour was then superimposed on the 1:50,000 NAMRIA topograhic map to see the areas that may be affected by the noise generated by the operation of the airports.
F. Potential impact of the noise to be generated by the airport operations was assessed using the DENR standard for ambient noise. The following table lists the standards established by the Department of Environment and Natural Resources (DENR) for allowable noise levels in different areas at various times of the day.

Table 1. Ambient Noise Standard after Rules and Regulations of the NPCC, 1978)

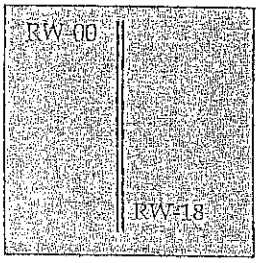
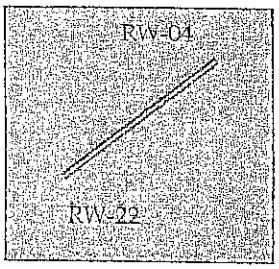
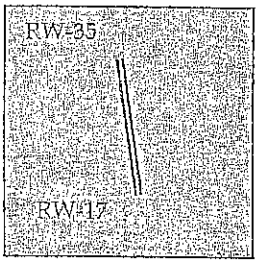
Area	Maximum Allowable Noise Level (dB (A)		
	Daytime 0900H-1800H	Morning/Early Evening 0500H-0900H/2200H-0500H	Nighttime 1800H-2200H
Schools, Hospitals	50	45	40
Residential	55	50	45
Commercial	65	60	55
Light Industrial	70	65	60
Heavy Industrial	75	70	65

3. Assumptions

A. Runway Location

Three sites were investigated by TCGI for the feasibility study of the Panglao Island Airport. These are the following alternative sites:

Table 2. Airport Location and Runway ends.

Alternatives	Runway Ends		Geographic Coord.	
			Latitude	Longitude
Alternative 1 Tawala, Municipality of Panglao		RW-00 RW-18	9.757° 9.576°	123.771° 123.771°
Alternative 2, Municipality of Dauis		RW 04 RW 22	9.62° 9.59°	123.82° 123.794°
Alternative 3, Existing airport of Tagbilaran City		RW-35 RW-17 (extension)	9.68° 9.66°	123.85° 123.85°

B. Airport Condition and Runway Specification (User Input)

Table 3.

Ave. daytime temperature	29°C
Elevation	10 m ASL
Width of Runway	45 m
Length of Runway Panglao Dauis Tagbilaran	 3500 m. 4,500m 2,300m

C. Aircraft operations (User Input)

Table 4.

Planning Period	Aircraft Operations
2005	1 flights/day Boeing 737 1 Airbus 300 1 Emergency Flight/day
2015	2flights/day Boeing 737 2 flights/day Airbus 300 I Emergency Flight/day

All flights are assumed to be within daytime period (0900H to 1800H).

D. Aircraft Specifications (INM v5.1 Data)

Table 5.

	Boeing 737	Airbus 300
Maximum gross take-off weight in kgs.	49,442	165,108
Maximum gross landing weight	44,452	133,810
Maximum landing distance in meters	1,189	1,636
Number of Engines	2	2
Static thrust in lbs	14,500	52,500
Noise Type	2JT8D	2CF650
Engine	Jet	Jet

E. Results of the Noise Model

The result presented in the noise contour map is A-weighted, exposure based, day-night average sound level (DNL). Averaging time is 24 hours. Two noise maps are presented for every scenario, one is the noise contour map as generated by the USFAA INM 5.1 and the second is a map showing noise contours superimposed on the map of the airport and surrounding area.

Table 6. Summary of Results

Alternatives	Year 2005	Year 2015
Alternative 1 Brgy Tawala Municipality of Panglao	Approach – RW-00 Departure – RW-18 Noise levels of >55 db(A) are confined within the airport area. Higher noise levels are confined at the southern end of the airport (RW 18) which is the designated departure point and the northern end (RW-00) during approach and touchdown. Noise impact associated with the airport operations will have minimal impact outside the airport boundary. See **Figure Pang2005.**	Approach – RW-00 Departure- RW-00 Noise levels >55 db(A) may be experienced in areas immediately surrounding the airport and noise levels of 60 db(A) are confined within the northern part of the airport (RW 00), at the point of departure and touchdown. Noise impact during this period will not vary significantly from the impact of airport operations during Year 2005. See **Figure Pang2015.**
Alternative 2 Municipality of Dauis	Approach – RW-04 Departure – RW-04 Noise levels of >55db(A) is mostly confined within the airport boundary. Higher noise levels are only expected to prevail at the northeastern end (RW-04). Noise impact associated with airport operations during this study period is considered low. See **Figure DAU2005.**	Approach – RW-04 Departure – RW-04 Noise impact during this study period will not vary significantly from the impact of airport operations of Year 2005. See **Figure DAU2015**
Alternative 3 Existing Tagbilaran City Airport	Approach – RW-35 Departure - RW-35 Noise level of 55 db(A) will envelope an area within 250 meters from center of runway extending to about 750 meters from the southern end (RW17) of the runway. Higher noise levels are expected at the northern end (RW-35) of the runway, the area of departure and approach. See **Figure TAG2005.**	Approach – RW-35 Departure - RW-35 With increased flights during this study period, noise level of 55 db(A) will envelope an area of within 250 meters from center line of runway, extending to about 1.5 kms south of RW-17. Immediate surroundings of the airport will experience noise levels of 60db(A). Higher noise levels are expected at the end of RW35 at the point of departure and landing. See **Figure TAG2015.**

APPENDIX XI

GEOTECHNICAL STUDY – BORING LOGS & SUMMARY OF TEST RESULTS

(ADVANCED ENGINEERING STUDY)

INDUSTRIAL INSPECTION INT'L, INC.

CONTRACTOR'S LICENSE No 3774 (GENERAL ENGINEERING)
1175 Chino Roces Avenue, Makati M.M.

DATE OF REPORT : Jan. 22, 2001

PROJECT : PROPOSED AIRPORT

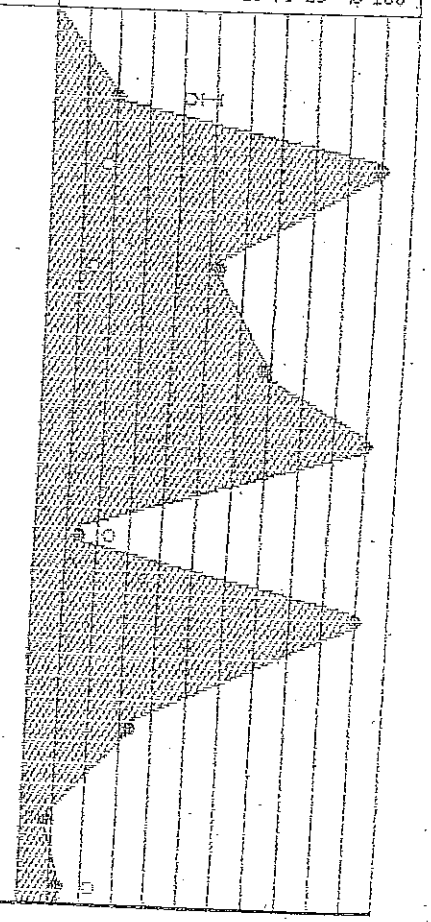
LOCATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

BOREHOLE NO : BH - 1
ELEVATION :
STATION :

DATE STARTED : 01-17-01
DATE COMPLETED : 01-18-01
G.W.L. :

DEPTH (meter)	N VALUE / BLOW/FT	LOG	SAMPLE NO.	SOIL DESCRIPTION	CONSISTENCY	RQD %	REC %	U.S.C	NMC %	LL %	PL %	PI %	OTHER TESTS
1	30		SPT-1	Reddish Brown, Silty SAND with little amount of gravel Coralline LIMESTONE.	M.Dense			SM	41	51	45	6	5
2	50/10		SPT-2	Brownish, Silty GRAVEL with some Sand, CORALLINE LIMESTONE.	V.Dense			GM	15	NP	NP	NP	6
3	53		SPT-3	Off-white, Poorly Graded GRAVEL and SAND with few Silt, Coralline LIMESTONE.				SP-GM	19	NP	NP	NP	6
4	59		SPT-4										
5	50/5		SPT-5										
6	14		SPT-6	Off-white, Poorly Graded GRAVEL with some sand and few silt, CORALLINE LIMESTONE.	M.Dense				23	NP	NP	NP	5
7	50/10		SPT-7		V.Dense								
8	32		SPT-8		Dense								
9	8		SPT-9		Loose								
10	12		SPT-10	Brownish Silty GRAVEL with some sand, CORALLINE LIMESTONE.	M.Dense			GM	22	NP	NP	NP	5



INDUSTRIAL INSPECTION INT'L, INC.

CONTRACTOR'S LICENSE No. 3774 (GENERAL ENGINEERING)

1175 Chino Roces Avenue, Makati M.M.

DATE OF REPORT : Jan. 22, 2001

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

BOREHOLE NO : BH - 1
ELEVATION :
STATION :

DATE STARTED : 01-17-01
DATE COMPLETED : 01-18-01
G.W.L. :

DEPTH (meters)	N VAL./ cm	LOG	SAMPLE NO.	SOIL DESCRIPTION	CONSIS-TENCY	RQD %	REC %	U.S.C	WMC %	LL %	PL %	PI %	OTHER TESTS	W_P W_N W_L 10 20 30 40 50 60 70 80 90 100
11	36		SPT-11	Brownish Silty GRAVEL with some sand, Coralline LIMESTONE.	Dense			GM						
12	56		SPT-12		V.Dense									
13	50/15		SPT-13	Off-white, Poorly Graded GRAVEL with little amount of sand and few Silt, Coralline Limestone.				GP-GM	23	NP	NP	NP	6	
14	50/10		SPT-14											
			Coring-1	Off-white, Coralline Limestone with Cavities.		0	35							
			Coring-2			0	45							

NOTES :

1. Boring terminated at the depth of 15.00 meters.
2. Lost water at 5.25m to 15.00m.
3. Water level - 11.12m.

INDUSTRIAL INSPECTION INT'L, INC.

CONTRACTOR'S LICENSE No 3774 (GENERAL ENGINEERING)

1175 China Roces Avenue, Makati M.M.

DATE OF REPORT : Jan. 22, 2001

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

BOREHOLE NO : BH - 2
ELEVATION :
STATION :

DATE STARTED : 01-14-01
DATE COMPLETED : 01-20-01
G.W.L. :

DEPTH (meters)	N VAL. / BLOWS/0.30m	LOG	SAMPLE NO.	SOIL DESCRIPTION	CONSISTENCY	#200 %	#40 %	U.S.C	NMC %	LL %	PL %	PI %	OTHER TESTS	Wp Wn Wl 10 20 30 40 50 60 70 80 90 100
1	44		SPT-1	Pinkish Poorly Graded GRAVEL and SAND with few Silt, CORALLINE LIMESTONE.	Dense			GP-GM	18	NP	NP	NP	G - S	
2	50		SPT-2	Pinkish Poorly Graded GRAVEL with little amount of Sand & traces of Silts, CORALLINE LIMESTONE.				GP	15	NP	NP	NP	- G -	
3	63		SPT-3		V.Dense									
4	34		SPT-4		Dense									
5	37		SPT-5	Pinkish Poorly Graded GRAVEL with some sand and traces of Silts, CORALLINE LIMESTONE.					15	NP	NP	NP	G	
6	47		SPT-6											
7	46		SPT-7	Off-white, Poorly Graded GRAVEL with little amount of sand and traces of Silts, Coralline LIMESTONE.					15	NP	NP	NP	G	
8	50		SPT-8											
9	54		SPT-9	Off-white, Poorly Graded GRAVEL and SAND with traces of Silts, Coralline LIMESTONE.	V.Dense			GP-GM	15	NP	NP	NP	G	
10	43		SPT-10		Dense									

INDUSTRIAL INSPECTION INT'L, INC.

CONTRACTOR'S LICENSE No. 3774 (GENERAL ENGINEERING)

1175 Chino Roces Avenue, Makati M.M.

DATE OF REPORT : Jan. 22, 2001

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

BOREHOLE NO : BH - 2

ELEVATION :

STATION :

DATE STARTED : 01-19-01

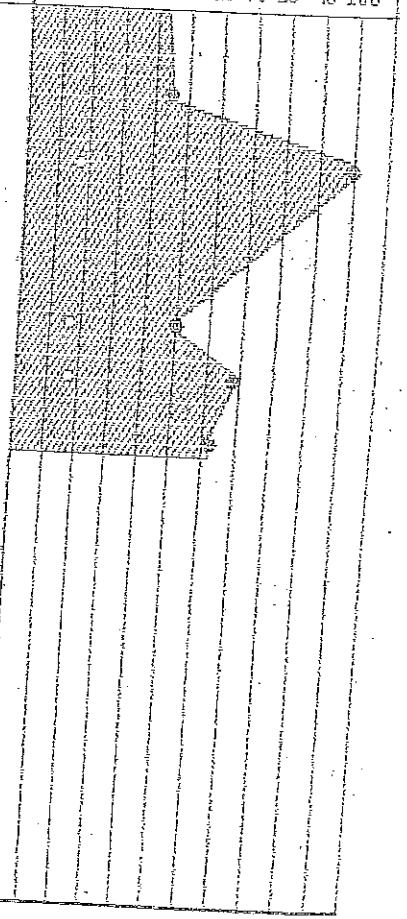
DATE COMPLETED : 01-20-01

G.W.L. :

DEPTH (meter)	BLOWS/0.30M	LOG	SAMPLE NO.	SOIL DESCRIPTION	CONSISTENCY	RQD %	REC %	U.S.C	MC %	LL %	PL %	PI %	OTHER TESTS
1	45		SPT-11	Yellowish, Poorly Graded GRAVEL with some sand and traces of Silts, CORALLINE LIMESTONE.	Dense			GP-GM	20	NP	NP	NP	G
2	40 / 25		SPT-12	Pinkish Poorly Graded GRAVEL and SAND with traces of Silts, CORALLINE LIMESTONE.	V.Dense				12	NP	NP	NP	G
3			Coring-1	Off-white Coralline Limestone with Cavities.		0	15						
4	50		SPT-13	Yellowish Poorly Graded GRAVEL with some sand and traces of Silts, CORALLINE LIMESTONE..	Dense			GP-GM	17	NP	NP	NP	G
	59		SPT-14		V.Dense			GP	10	NP	NP	NP	G
5	52		SPT-15	Off-White, Poorly Graded GRAVEL with some Sand & traces of Silts CORALLINE LIMESTONE.									

NOTES :

1. Boring terminated at the depth of 15.00 meters.
2. Lost water at 5.50m to 15.00m.
3. Water level is 10.20m.



INDUSTRIAL INSPECTION [INT'L.] INC.

CONTRACTOR'S LICENSE No. 3774 (GENERAL ENGINEERING)

1175 Chino Roces Avenue, Makati M.M.

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

DATE OF REPORT : Jan. 22, 2001

SUBSURFACE EXPLORATION LOG

BOREHOLE NO : BH - 3
ELEVATION :
STATION :

DATE STARTED : 01-14-01
DATE COMPLETED : 01-15-01
G.W.L. :

DEPTH (meter)	N VAL. / cm	LOG	SAMPLE NO.	SOIL DESCRIPTION	CONSIS-TENCY	RQD %	REC %	U.S.C	MMC %	LL %	PL %	PI %	OTHER TESTS	Wp Wn WL (10 20 30 40 50 60 70 80 90 100)
1	50/15		SPT-1	Reddish brown, Poorly Graded GRAVEL with some Sand and few amount of Silt.	V.Dense			GP-GM	18	NP	NP	NP	G	
2	50/10		SPT-2	Brownish, Poorly Graded GRAVEL and SAND, Coralline LIMESTONE.					13	NP	NP	NP	G	
3	40		SPT-3	Off-White, Poorly Graded GRAVEL with some sand, CORALLINE LIMESTONE.	Dense			GP	18	NP	NP	NP	G	
4	69		SPT-4		V.Dense									
5	75/25		SPT-5											
6			Coring-1	Off-white, Coralline Limestone with Cavities.		0	24							
7			Coring-2			0	23							
8			Coring-3			0	29							
9			Coring-4			0	25							
10	32		SPT-6	Off-white, Poorly Graded GRAVEL with some Sand, CORALLINE LIMESTONE.	Dense			GP	10	NP	NP	NP	G	

INDUSTRIAL INSPECTION INT'L., INC.

CONTRACTOR'S LICENSE No 3774 (GENERAL ENGINEERING)
1175 Chino Roces Avenue, Makati M.M.

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

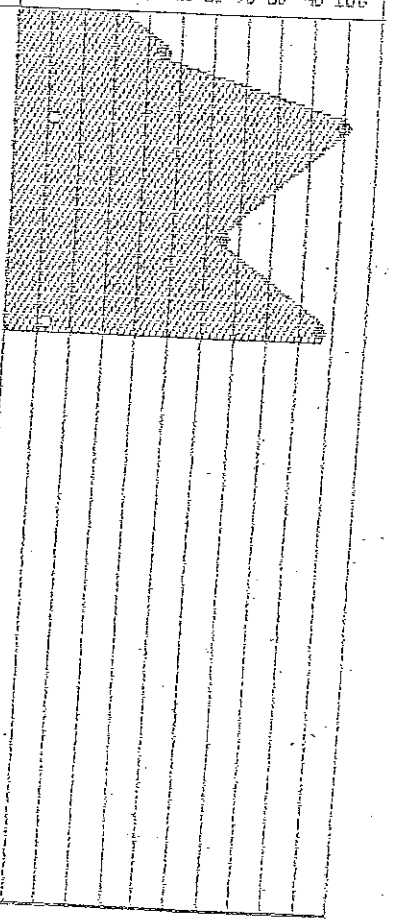
DATE OF REPORT : Jan. 22, 2001

SUBSURFACE EXPLORATION LOG

BOREHOLE NO : BH - 3.
ELEVATION :
STATION :

DATE STARTED : 01-14-01
DATE COMPLETED : 01-22-01
G.W.L. :

DEPTH (meter)	VAL. (cm)	LOG	SAMPLE NO.	SOIL DESCRIPTION	CONSIS-TENCY	RQD %	REC %	U.S.C	NMC %	LL %	PL %	PI %	OTHER TESTS
11	45		SPT-7	Off-White, Poorly Graded GRAVEL with some sand, CORALLINE LIMESTONE.	Dense			GP					
	50/10		SPT-8	Off-white, Poorly Graded GRAVEL and SAND, CORALLINE LIMESTONE.	V.Dense				11	NP	NP	NP	G
12													
	85		SPT-9										
13													
	98		SPT-10					SP-SM	12	NP	NP	NP	G
14			Coring-5	Off-white, Coralline Limestone with Cavities.		0	20						
15			Coring-5			0	25						



NOTES :

1. Boring terminated at the depth of 15.00 meters.
2. Last Water @ 3.50m to 15.0m.
3. Water level is 4.45m.

INDUSTRIAL INSPECTION (INT'L.) INC.

CONTRACTOR'S LICENSE No. 3774 (GENERAL ENGINEERING)
1175 Chino Roces Avenue, Makati M.M.

DATE OF REPORT : Jan. 22, 2001

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

BOREHOLE NO : BH - 4
ELEVATION :
STATION :

DATE STARTED : 01-12-01
DATE COMPLETED : 01-13-01
G.W.L. :

DEPTH (meters)	N VALUE (BLOWS/FT)	LOG	SAMPLE NO.	SOIL DESCRIPTION	CONSISTENCY	PASS #200 %	PASS #4 %	U.S.C.	NMC %	LL %	PL %	PI %	OTHER TESTS	Wp / WN / WL 10 20 30 40 50 60 70 80 90 100
1	42		SPT-1	Reddish brown to brown, Silty GRAVEL with Sand CORALLINE LIMESTONE.	Dense			GM	13	54	33	31	B	
2	62		SPT-2	Brownish Poorly Graded GRAVEL with Sand, CORALLINE LIMESTONE.	V.Dense			GP	11	NP	NP	NP	G	
3	50/15		SPT-3						11	NP	NP	NP	G	
4	50/2		SPT-4	Off-white, Poorly Graded GRAVEL with SAND, CORALLINE LIMESTONE.				GP-GM	16	NP	NP	NP	G	
5	11		SPT-5		M.Dense			GP	14	NP	NP	NP	G	
6	32		SPT-6		Dense									
7	50/5		SPT-7		V.Dense									
8	55		SPT-8											
9			Coring-1			0	28							
10			Coring-2			0	27							

INDUSTRIAL INSPECTION INT'L, INC.

CONTRACTOR'S LICENSE No. 3774 (GENERAL ENGINEERING)

1175 Chino Roces Avenue, Makati M.M.

DATE OF REPORT : Jan. 22, 2001

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, AIRPORT

SUBSURFACE EXPLORATION LOG

BOREHOLE NO : BH - 4

ELEVATION :

STATION :

DATE STARTED : 01-12-01

DATE COMPLETED : 01-12-01

G.W.L. :

DEPTH (meter)	N VALUE (SPT)	LOG	SAMPLE NO.	SOIL DESCRIPTION	CONSISTENCY	RQD %	REC %	U.S.C	NMC %	LL %	PL %	PI %	OTHER TESTS	Wp / Wn / WL (10 20 30 40 50 60 70 80 90 100)
11	58		SPT-9	Off-white, Poorly Graded-GRAVEL with Sand, CORALLINE LIMESTONE.	V.Dense			GP-GM	14	NP	NP	NP	G	
12	58		SPT-10											
13	62		SPT-11											
14	53		SPT-12						17	NP	NP	NP	G	
15	52		SPT-13											

NOTES :

1. Boring terminated at the depth of 15.00 meters.
2. Lost water 3.50m to 15.0m.
3. Water level is 40.2m.

INDUSTRIAL INSPECTION INT'L, INC.

CONTRACTOR'S LICENSE No 3774 (GENERAL ENGINEERING)

1175 Chino Roces Avenue, Makati M.M.

DATE OF REPORT : Jan. 22, 2001

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

BOREHOLE NO : BH - 5
ELEVATION :
STATION :

DATE STARTED : 01-10-01
DATE COMPLETED : 01-11-01
G.W.L. :

DEPTH (meter)	N VALUE/ 30cm	LOG	SAMPLE NO.	SOIL DESCRIPTION	CONSISTENCY	RQD %	REC %	U.S.C	NMC %	LL %	PL %	PI %	OTHER TESTS	Wp / W / WL (10 20 30 40 50 60 70 80 90 100)
1	19		SPT-1	Brown, Sandy Elastic SILT with few amount of gravel.	Stiff			MH	61	55	34	21	G	
2	28		SPT-2		V.Stiff									
3			Coring-1	Off-white Coralline Limestone With Cavities.		0	28							
4	41		SPT-3	Yellowish Brown, Poorly Graded GRAVEL with Sand, Coralline LIMESTONE.	Dense			SP	9	NP	NP	NP	G	
5	51/30		SPT-4		V.Dense									
6			Coring-2	Off-white, Coralline Limestone With Cavities.		0	28							
7			Coring-3			0	30							
8	77		SPT-5	Off-white, Poorly Graded GRAVEL with traces of Sand CORALLINE LIMESTONE.	V.Dense			GP	5	NP	NP	NP	G	
9			Coring-4	Off-white, Coralline Limestone With Cavities.		0	23							
10														

INDUSTRIAL INSPECTION INT'L, INC.

CONTRACTOR'S LICENSE No. 3774 (GENERAL ENGINEERING)

1175 Chino Roces Avenue, Makati M.M.

DATE OF REPORT : Jan. 22, 2001

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

BOREHOLE NO : BH - 5

ELEVATION :

STATION :

DATE STARTED : 01-10-01

DATE COMPLETED : 01-11-01

G.W.L. :

DEPTH (meters)	N VAL. /cm	LOG	SAMPLE NO.	SOIL DESCRIPTION	CONSIS-TENCY	RQD %	REC %	U.S.C.	NMC %	LL %	PL %	PI %	OTHER TESTS	W_P 10 20 30 40 50 60 70 80 90 100 W_N W_L
11	92/20		SPT-7	Off-white, Poorly Graded GRAVEL with Sand, CORALLINE LIMESTONE.	V.Dense			GP						
12	84		SPT-8											
13			Coring-5	Off-white, Coralline Limestone with Cavities.		0	25							
14	83/25		SPT-9	Off-white Poorly Graded GRAVEL with little amount of Sand CORALLINE LIMESTONE.	V.Dense			GP	7	NP	NP	NP	5	
15			Coring-6	Off-white, Coralline Limestone with Cavities.		0	23							

NOTES :

1. Boring terminated at the depth of 15.00 meters.
2. Loosing water at 3.50m to 8.0m.
3. Water level is 10.22m.

INDUSTRIAL INSPECTION [INT'L.] INC.

CONTRACTOR'S LICENSE No. 3774 (GENERAL ENGINEERING)

1175 Chino Roces Avenue, Makati M.M.

DATE OF REPORT : Jan. 22, 2001

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

BOREHOLE NO : BH - 6
ELEVATION :
STATION :

DATE STARTED : 01-16-01
DATE COMPLETED : 01-17-01
G.W.L. :

DEPTH (meter)	N VAL./ cm	LOG	SAMPLE NO.	SOIL DESCRIPTION	CONSIS-TENCY	RQD %	REC %	U.S.C	NMC %	LL %	PL %	PI %	OTHER TESTS	W_P — W_N — W_L (10 20 30 40 50 60 70 80 90 100)
1	12		SPT-1	Reddish brown, Silty GRAVEL with little amount of Sand.	M.Dense			GM	35	56	52	4	G	
2	30		SPT-2	Brownish, Silty SAND with some amount of gravel, CORALLINE LIMESTONE.				SM	21	NP	NP	NP	G	
3	61		SPT-3	Brownish, Poorly Graded GRAVEL and SAND with few silt, CORALLINE LIMESTONE.	V.Dense			SP-SM	18	NP	NP	NP	G	
4	76		SPT-4	Off-white, Poorly Graded SAND with some gravel, CORALLINE LIMESTONE.				SP-SM	17	NP	NP	NP	G	
5	76		SPT-5											
6			Coring-1	Off-white, Coralline Limestone with Cavities.		0	25							
			Coring-2											
7	34		SPT-6	Brownish, Silty GRAVEL with little amount of Sand, Coralline Limestone.	Dense	0	24	GM	21	NP	NP	NP	G	
8	42		SPT-7											
9	36		SPT-8											
10	12		SPT-9		M.Dense									

INDUSTRIAL INSPECTION INTL., INC.

CONTRACTOR'S LICENSE No. 3774 (GENERAL ENGINEERING)

1175 Chino Roces Avenue, Makati M.M.

DATE OF REPORT : Jan. 22, 2001

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

BOREHOLE NO : BH - 5
ELEVATION :
STATION :

DATE STARTED : 01-16-01
DATE COMPLETED : 01-17-01
G.W.L. :

DEPTH (meters)	N VALUE/30cm	LOG	SAMPLE NO.	SOIL DESCRIPTION	CONSISTENCY	PASS #200 %	REC %	U.S.C.	NMC %	LL %	PL %	PI %	OTHER TESTS	Wp / WN / WL (10 20 30 40 50 60 70 80 90 100)
11	35		SPT-10	Brownish Silty GRAVEL with little amount of sand, Coralline Limestone.	Dense			GM						
12	36		SPT-11	Off-white, Poorly Graded GRAVEL with little amount of Sand.				GP						
13	62		SPT-12		V.Dense									
14	35		SPT-13		Dense									
	49		SPT-14	Off-white, Poorly Graded GRAVEL with some sand & few amount of Silt Coralline Limestone.				GP-GM	30	NP	NP	NP	6	

NOTES :

1. Boring terminated at the depth of 15.00 meters.
2. Lost water at 5.30m to 15.00m.
3. Water level is 10.51m.

INDUSTRIAL INSPECTION [INT'L] INC.

CONTRACTOR'S LICENSE No 3774 (GENERAL ENGINEERING)
1175 Chino Roces Avenue, Makati M.M.

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

DATE OF REPORT : Jan. 22, 2001

SUBSURFACE EXPLORATION LOG

BOREHOLE NO : BH - 7
ELEVATION :
STATION :

DATE STARTED : 01-06-01
DATE COMPLETED : 01-08-01
G.W.L. :

DEPTH (Meter)	N VALUE (BLOWS/FT)	LOG	SAMPLE NO.	SOIL DESCRIPTION	CONSISTENCY	RQD %	REC %	U.S.C	NMC %	LL %	PL %	PI %	OTHER TESTS	W_N W_P W_L 10 20 30 40 50 60 70 80 90 100
1	7		SPT-1	Brown, Sandy Elastic SILT with traces of gravel, Coralline LIMESTONE.	M.Stiff			MH	50	78	37	42	G	
2	27		SPT-2		V.Stiff									
3	9		SPT-3	Brown, Clayey SAND and GRAVEL CORALLINE LIMESTONE.	Stiff			SC	19	64	27	37	G	
4	73/20		SPT-4	Yellowish Brown, Poorly Graded GRAVEL With Silt, CORALLINE LIMESTONE.	V.Dense			GP-GM	13	NP	NP	NP	G	
5			Coring-1	Off-White Coralline Limestone With Cavities.		0	25							
6	35/20		SPT-5	Brownish Poorly Graded GRAVEL with Sand, CORALLINE LIMESTONE.	V.Dense			GP	7	NP	NP	NP	G	
7			Coring-2	Off-White, Coralline Limestone with Cavities.		0	34							
8			Coring-3			0	28							
9			Coring-4			0	35							
10			Coring-5			0	26							

INDUSTRIAL INSPECTION (INT'L.) INC.

CONTRACTOR'S LICENSE No. 3774 (GENERAL ENGINEERING)
1175 Chino Roces Avenue, Makati M.M.

DATE OF REPORT : Jan. 22, 2001

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

BOREHOLE NO : BH.- 7
ELEVATION :
STATION :

DATE STARTED : 01-06-01
DATE COMPLETED : 01-08-01
G.W.L. :

DEPTH (meters)	# VAL/cm	LOG	SAMPLE NO.	SOIL DESCRIPTION	CONSIS-TENCY	ROD %	REC %	U.S.C	NMC %	LL %	PL %	PI %	OTHER TESTS
11	95/25		SPT-6	Off-white, Poorly Graded SAND with little amount of Gravel, Coralline Limestone.	V.Dense			SP	17	NP	NP	NP	G
	103/20		SPT-7										
12													
13													
	82		SPT-8										
14													
15	95		SPT-9	Off-white, Poorly Graded SAND and GRAVEL, CORALLINE LIMESTONE.				SP-SM	11	NP	NP	NP	G

NOTES :

1. Boring terminated at the depth of 15.00 meters.
2. Loosing water at 3.0m to 15.0m.
3. Water level - 10.33m.

INDUSTRIAL INSPECTION [INT'L.] INC.

CONTRACTOR'S LICENSE No. 3774 (GENERAL ENGINEERING)
1175 Chino Roces Avenue, Makati City

ROJECT : PROPOSED AIRPORT

)CATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

TEST PIT NO : TP-1

Time Taken to Drill hr. min.	LOG	SOIL DESCRIPTION	CONSIS-TENCY	GRD %	SEC %	U S C	NAT.	LL	PL	PI	Wp WN WL 10 20 30 40 50 60 70 80 90 100
		Reddish brown, Sandy Elastic SILT				MH	35	57	38	19	
		Off-white Silty Sand w/ Coralline LIMESTONE fragments				SM	16	NP	NP	NP	

NOTE : Water level was not encountered

INDUSTRIAL INSPECTION INT'L., INC.

CONTRACTOR'S LICENSE No. 3774 (GENERAL ENGINEERING)

1175 Chino Roces Avenue, Makati City

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

TEST PIT NO : TP-2

Time Taken to Drill (hr. | min.)	LOG	SOIL DESCRIPTION	CONSIS-TENCY	MOD %	REC %	U S C	NMC	LL	PL	PI	W_D — W_N — W_L (10 20 30 40 50 60 70 80 90 100)
		Reddish Brown, Sandy Elastic SILT				MH	44	51	39	12	
		Offwhite Clayey SAND with Coralline Limestone fragments				SC	11	34	21	13	

NOTE : Water level was not encountered

INDUSTRIAL INSPECTION (INT'L.) INC.

CONTRACTOR'S LICENSE No. 3774 (GENERAL ENGINEERING)

1175 Chino Roces Avenue, Makati City

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

TEST PIT NO : TP-4

Depth	Time Taken to Drill hr.	Time Taken to Drill min.	LOG	SOIL DESCRIPTION	CONSISTENCY	RQD %	REC %	U S C	NMC	LL	PL	PI	Wp / WN / WL 10 20 30 40 50 60 70 80 90 100
				Reddish brown, Sandy Elastic SILT				MH	28	72	48	27	
				Off-White Clayey SAND with Coralline Limestone fragments				SC	18	39	23	16	

NOTE : Water level was not encountered

INDUSTRIAL INSPECTION [INT'L.] INC.

CONTRACTOR'S LICENSE No. 3774 (GENERAL ENGINEERING)

1175 Chino Roces Avenue, Makati City

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

TEST PIT NO : TP-5

Depth	Time Taken to Drill hr. min.	LOG	SOIL DESCRIPTION	CONSIS-TENCY	RQD %	REC %	USC	NMC	LL	PL	PI	WP WR WL 10 20 30 40 50 60 70 80 90 100
			Reddish brown, Poorly Graded Gravel w/ little amount of Sand Coralline Limestone				GP-GC	11	36	23	14	
			Off-White Sandy SILT w/ Coralline Limestone fragments				ML	30	44	34	10	

NOTE : Water level was not encountered

INDUSTRIAL INSPECTION (INT'L) INC.

CONTRACTOR'S LICENSE No. 3774 (GENERAL ENGINEERING)

1175 Chino Roces Avenue, Makati City

PROJECT : PROPOSED AIRPORT

LOCATION : PANGLAO, BOHOL

SUBSURFACE EXPLORATION LOG

TEST PIT NO : TP-6

Depth	Time Taken to Drill hr. / min.	LOG	SOIL DESCRIPTION	CONSISTENCY	MOD %	REC %	U S C	NMC	LL	PL	PI	Wp WN WL 10 20 30 40 50 60 70 80 90 100
			Reddish brown Sandy Elastic SILT w/traces of gravel Coralline Limestone				MH	46	52	39	23	
			Off-White Silty Sand w/ Coralline Limestone fragments				SM	24	53	44	9	

NOTE : Water level was not encountered

MATERIAL INSPECTION (INTERNATIONAL), INC.
CONTRACTOR"S LICENSE NO. 3774 (GEN. ENG'G & BLDG.) • MCC P.O. BOX 1071 PHILIPPINES
Second Floor, MJL Building, 1175 Chino Roces St., Makati, Metro Manila
Tel. Nos. 815-96-29; 815-93-01 to 08 loc 29

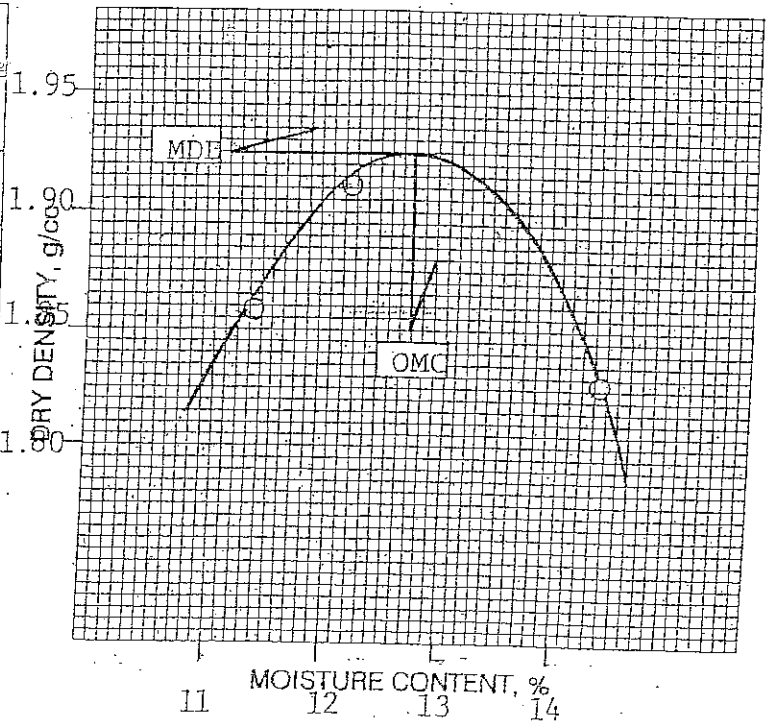
TEST REPORT NO.MDR- 2135 LIG

LABORATORY SOIL COMPACTION TEST

PROJECT: Proposed Panglao Airport	SAMPLE NO. TP-1
LOCATION: Panglao, Bohol	DEPTH: .3m - 1.5m

DATA:

TRIAL NUMBER	1	2	3	4	5	6
Water added, cc.	0	150	300	-	-	-
wt. of wet soil g.	4333	4490	4380	-	-	-
Wet Unit Weight, g/cc	2.069	2.144	2.091	-	-	-
Water content, %	11.31	12.16	14.33	-	-	-
Dry unit weight, g/cc	1.859	1.91 2	1.829	-	-	-



Method: ASTM D-1557

Tested By: I.C. Hernandez/I.A. De Torres
Materials Technician

Checked By: C.P. Cruz
Materials Engr. IV

Noted By: C.A. Manigos
Manager-Geotech

Date Tested: January 18, 2001

Date Reported: January 24, 2001

mdd = 1.925 g/cc
omc = 12.70 %

TEST REPORT NO.: CBR 0513 LTG

CALIFORNIA BEARING RATIO TEST

Maximum Dry Density, g/cc = 1.925

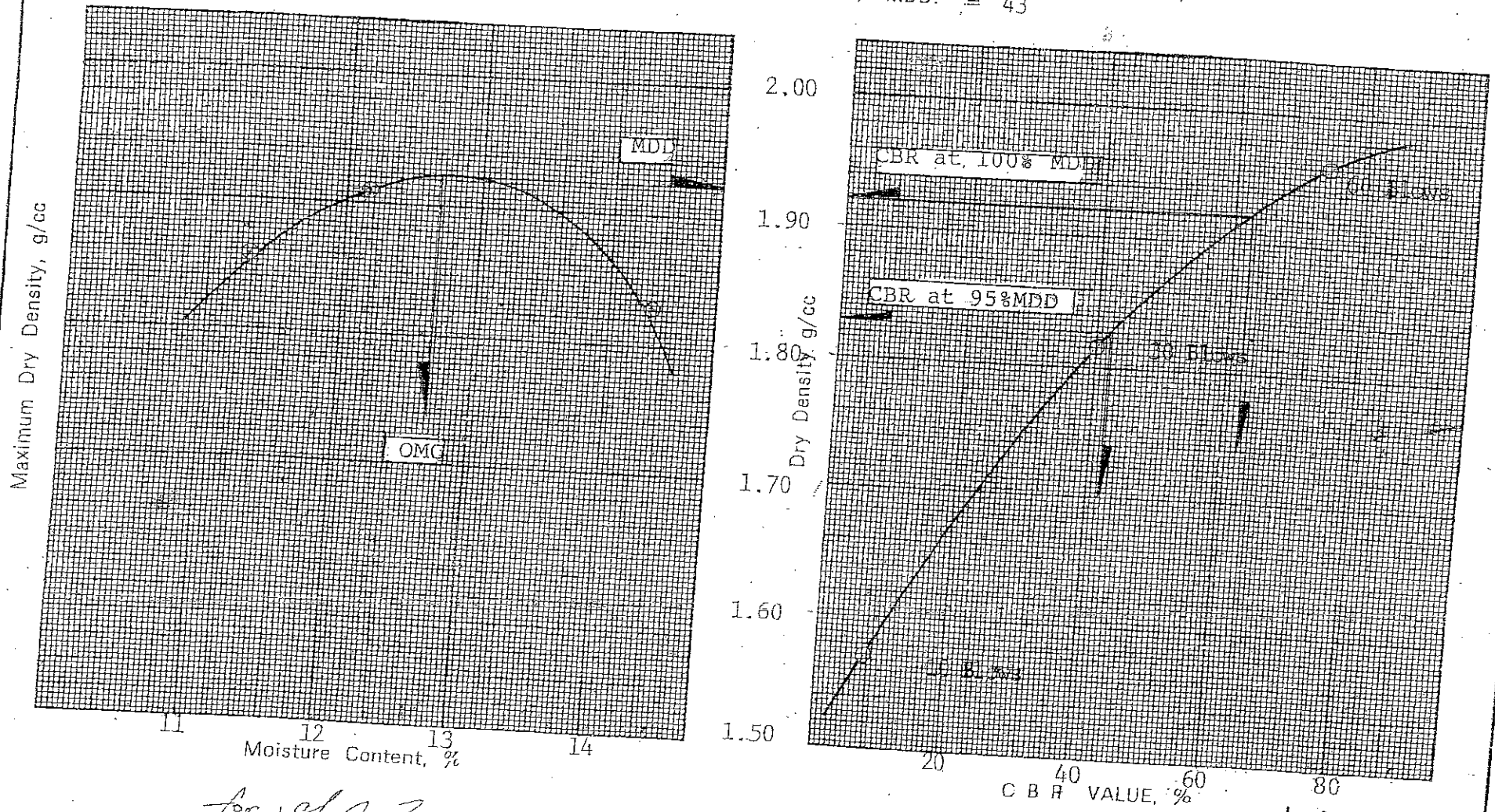
Optimum Moisture Content, % = 12.7

TP-1

CBR VALUE at 100 % MDD: = 64

0.3 - 1.5m

CBR VALUE at 95 % MDD: = 43



TESTED BY: for I. C. Hernandez, Materials Technician

CHECKED BY: C. P. Cruz, Materials Engr. IV

NOTED BY: O. B. Manigos

INDUSTRIAL INSPECTION (INTERNATIONAL), INC.

CONTRACTOR"S LICENSE NO. 3774 (GEN. ENG'G & BLDG.) • MCC P.O. BOX 1071 PHILIPPINES
Second Floor, MJL Building, 1175 Chino Roces St., Makati, Metro Manila
Tel. Nos. 815-96-29; 815-93-01 to 08 loc 29

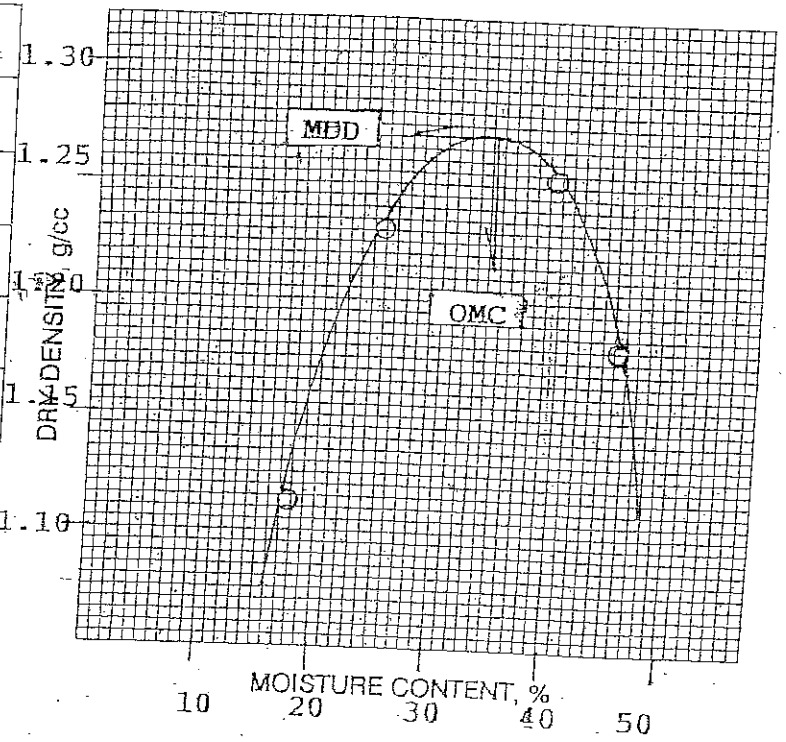
TEST REPORT NO.MDR- 0323 LIG

LABORATORY SOIL COMPACTION TEST

PROJECT: Proposed Panglao Airport	SAMPLE NO. TP-2
LOCATION: Panglao, Bohol	DEPTH: 0.00-0.40m.

DATA:

TRIAL NUMBER	1	2	3	4	5	6
Water added, cc.	0	200	400	600		
wt. of wet soil g.	1197	1413	1609	1592		
Wet Unit Weight, g/cc	1.301	1.536	1.749	1.730		
Water content, %	18.14	24.90	39.53	46.32		
Dry unit weight, g/cc	1.101	1.230	1.253	1.182		



Method: ASTM D 698 Procedure A

Tested By: E.R. CLEMENTE
Mat'ls. Tech.

Checked By: D.S. MACATANGAY
Mat'ls. Eng'r. IV

Noted By: V.C. EDUARDO
AVP-Proy't. Operation

Date Tested: Jan. 22,2001

Date Reported: Jan. 23,2001

MDD - 1.270 g/cc
OMC - 34.80 %

CONTRACTOR'S LICENSE NO. 3774 (GENERAL ENGINEERING) • MCC P.O. BOX 1071 PHILIPPINES

TEST REPORT NO.: CBR 0058 LTG

TP-2 (0.00-0.40)

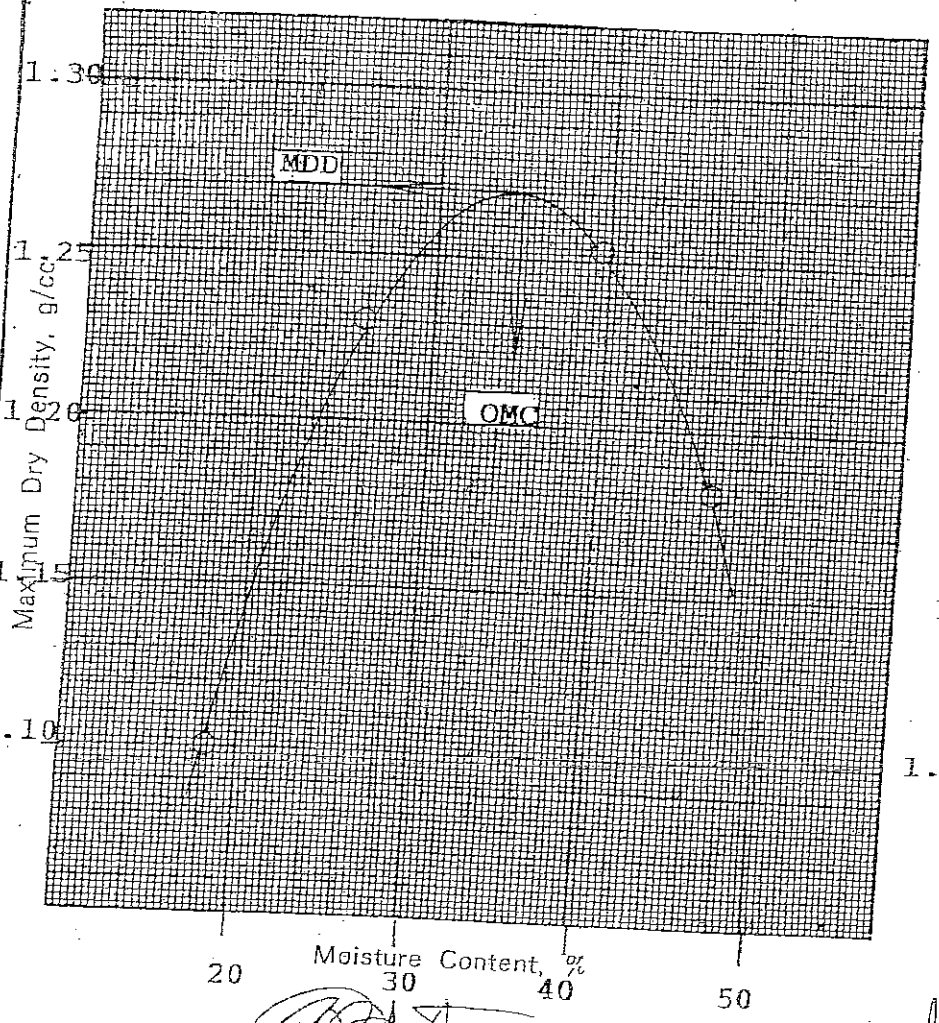
CALIFORNIA BEARING RATIO TEST

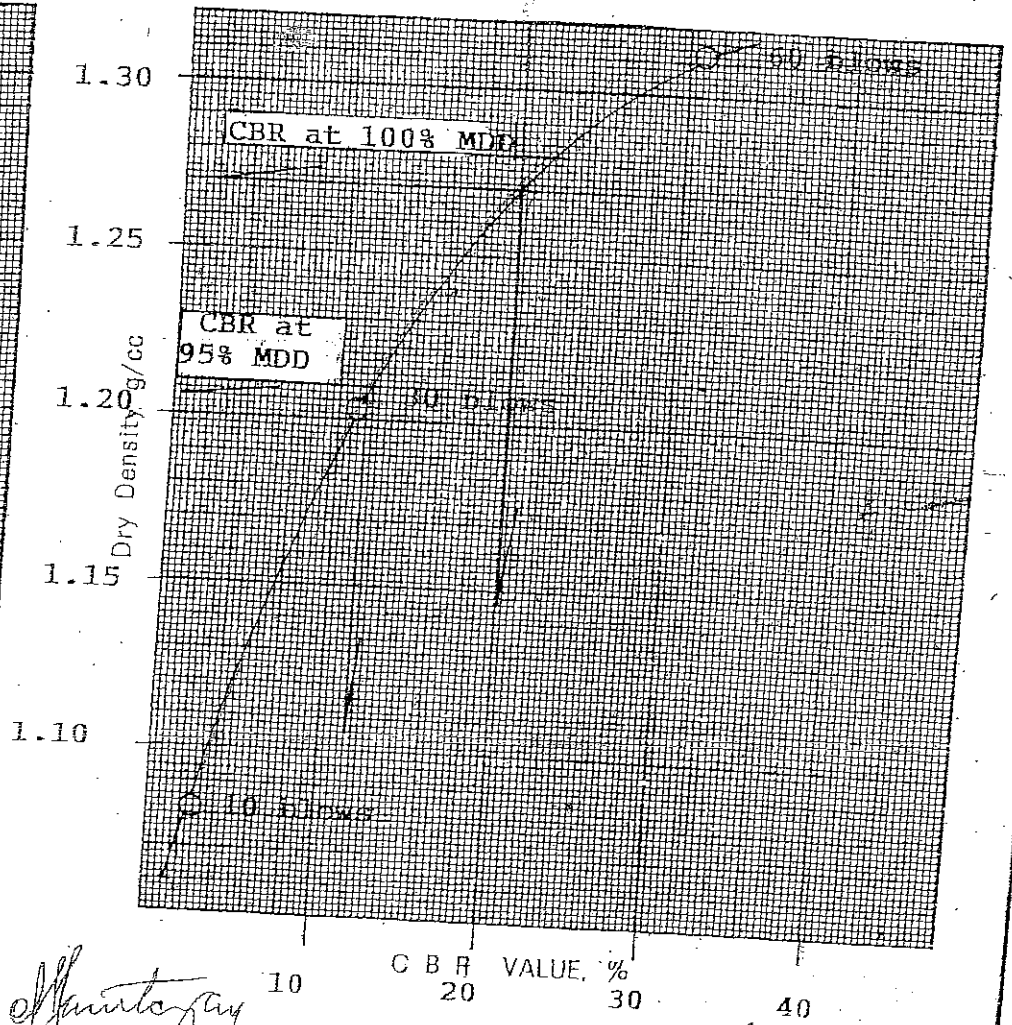
Maximum Dry Density, g/cc 1.270

Optimum Moisture Content, % 34.80

CBR VALUE at 100 % MDD: 20

CBR VALUE at 95 % MDD: 12





TESTED BY: E. R. CLEMENTE Mat'ls. Tech.

CHECKED BY: D.S. MACATANGAY Mat'Ls. Engr. IV

V.C. EDUARDO
NOTED BY AVP-PROJ'L. CORD.

INDUSTRIAL INSPECTION (INTERNATIONAL), INC.

CONTRACTOR"S LICENSE NO. 3774 (GEN. ENG'G & BLDG.) • MCC P.O. BOX 1071 PHILIPPINES
Second Floor, MJL Building, 1175 Chino Roces St., Makati, Metro Manila
Tel. Nos. 815-96-29: 815-93-01 to 08 loc 29

LABORATORY SOIL COMPACTION TEST

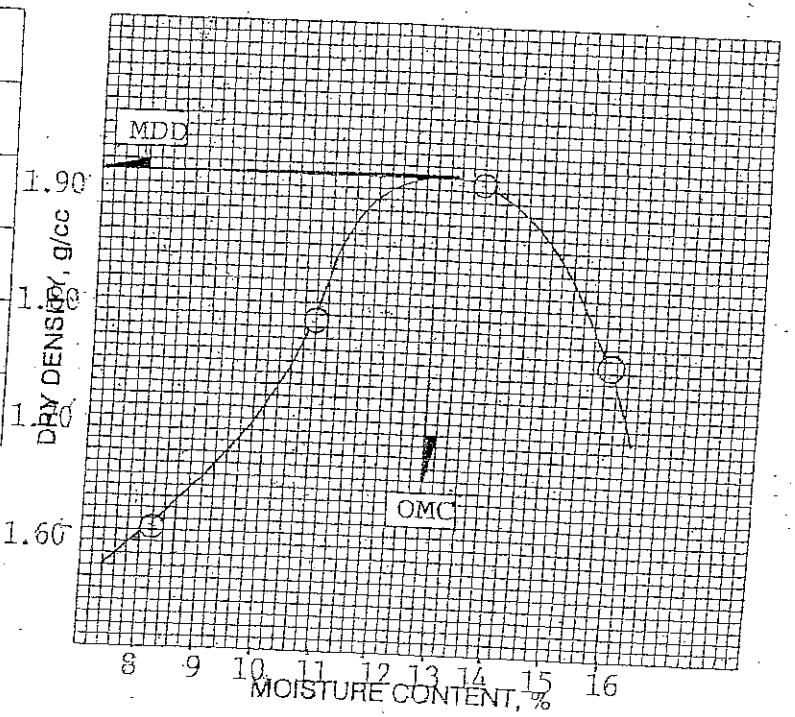
TEST REPORT NO.MDR- 2138 LIG

PROJECT: Proposed Panglao Airport | SAMPLE NO. TP-3

LOCATION: Panglao, Bohol | DEPTH: 0.3 - 1.5m

DATA:

TRIAL NUMBER	1	2	3	4	5	6
Water added, cc.	0	150	300	450	-	-
wt. of wet soil g.	3631	4142	4533	4253	-	-
Wet Unit Weight, g/cc	1.734	1.978	2.164	2.031	-	-
Water content, %	8.2	10.80	13.6	15.9	-	-
Dry unit weight, g/cc	1.602	1.785	1.905	1.752	-	-



Method: ASTM D-1557

Tested By: I. A. De Torres, Materials Technician

Checked By: C. P. Cruz, Materials Engr. IV

Noted By: A. Manigos, Manager-Geotech

Date Tested: January 18, 2001

Date Reported: January 24, 2001

mdd = 1.910 g/cc.

omc = 12.8 %

CONTRACTOR'S LICENSE NO. 3774 (GENERAL ENGINEERING) • MCC P.O. BOX 1071 PHILIPPINES

TEST REPORT NO.: CBR 0516 LTG

CALIFORNIA BEARING RATIO TEST

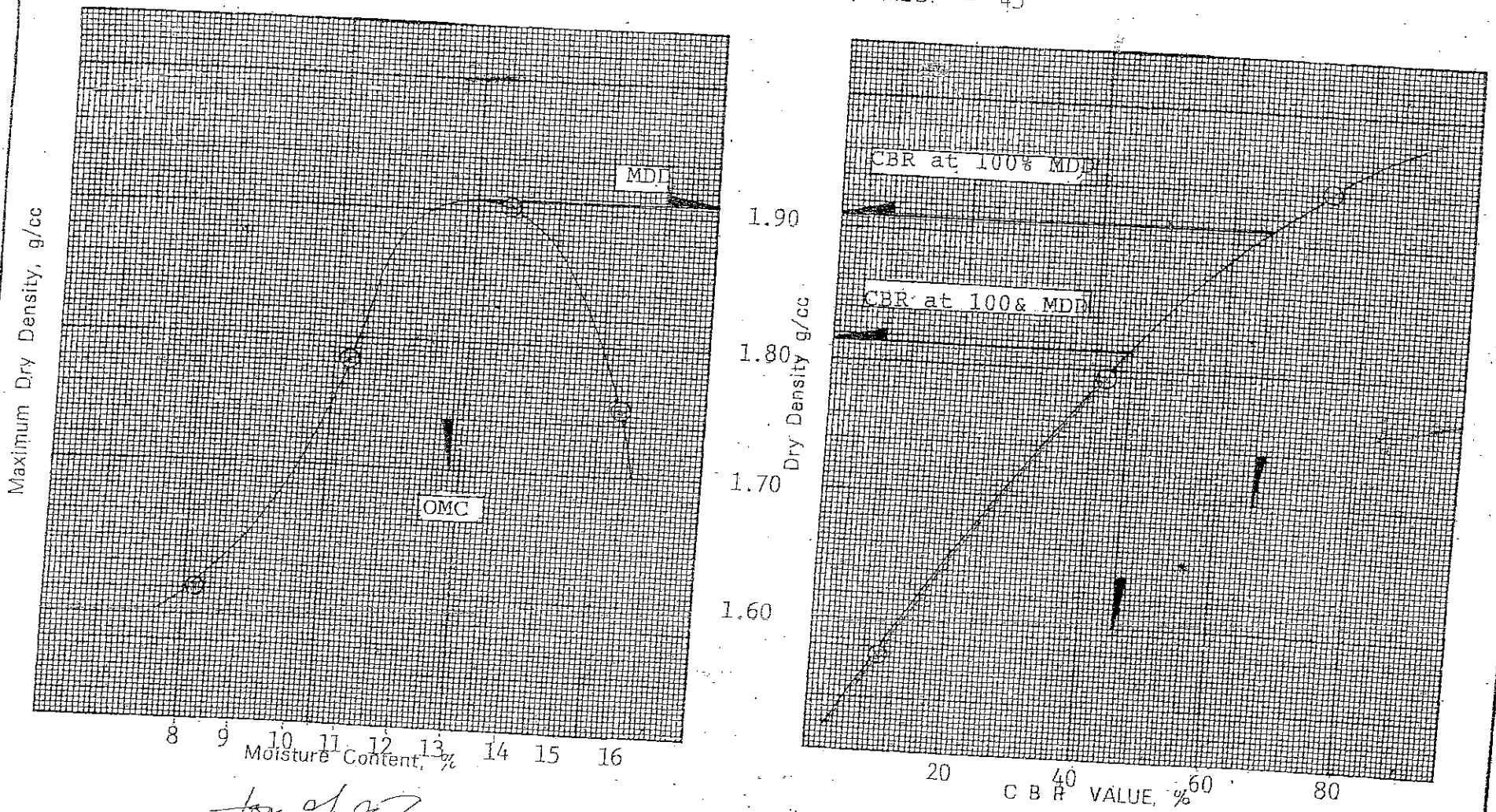
Maximum Dry Density, g/cc = 1.910

Optimum Moisture Content, % = 12.8

TP-3
0.3 - 1.5m

CBR VALUE at 100 % MDD: = 65

CBR VALUE at 95 % MDD: = 45



I. C. Hernandez
TESTED BY: Materials Technician

C. P. Cruz
CHECKED BY: Materials Engr. IV

a. Manigos
NOTED BY: Manager-Geotech

INDUSTRIAL INSPECTION (INTERNATIONAL), INC.
CONTRACTOR'S LICENSE NO. 3774 (GEN. ENG'G & BLDG.) • MCC P.O. BOX 1071 PHILIPPINES
Second Floor, MJL Building, 1175 Chino Roces St., Makati, Metro Manila
Tel. Nos. 815-96-29; 815-93-01 to 08 loc 29

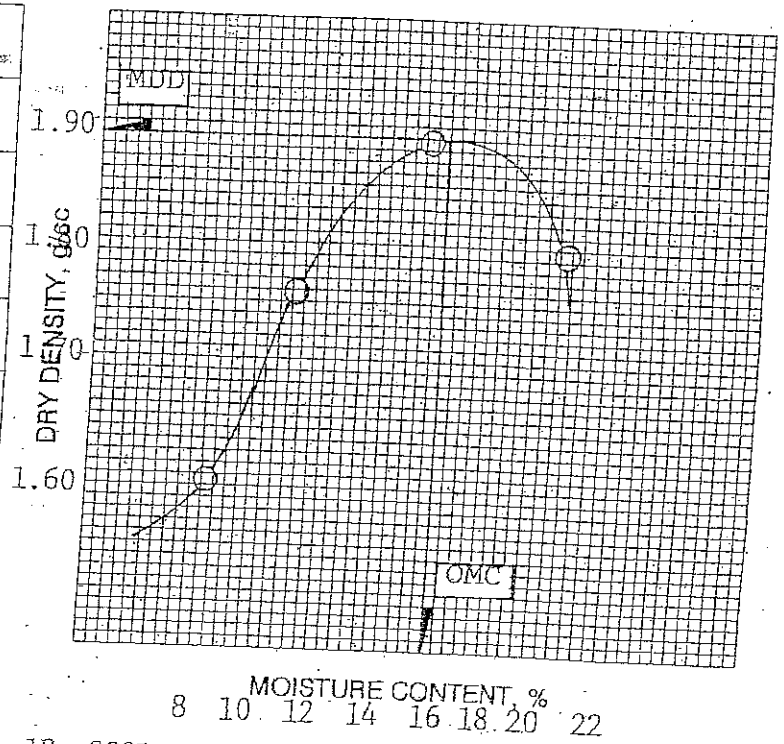
TEST REPORT NO.MDR- 2139 LJG

LABORATORY SOIL COMPACTION TEST

PROJECT: Proposed Panglao Airport	SAMPLE NO. TP-4
LOCATION: Panglao, Bohol	DEPTH: 0.2 - 1.5m

DATA:

TRIAL NUMBER	1	2	3	4	5	6
Water added, cc.	0	150	300	450	-	-
wt. of wet soil g.	3615	4089	4570	4520	-	-
Wet Unit Weight, g/cc	1.726	1.952	2.182	2.152	-	-
Water content, %	8.2	11.0	15.5	20.3	-	-
Dry unit weight, g/cc	1.595	1.759	1.889	1.794	-	-



Method: ASTM D-1557

Tested By: for I. C. Hernandez, Materials Technician

Checked By: C. P. Cruz, Materials Engr. IV

Noted By: G. A. Manrigos, Manager-Geotech

Date Tested: January 18, 2001

Date Reported: January 24, 2001

mdd = 1.89 g/cc.
omc = 16.0 %

CONTRACTOR'S LICENSE NO. 3774 (GENERAL ENGINEERING) • MCC P.O. BOX 1071 PHILIPPINES

TEST REPORT NO.: CBR 0514 LTG

CALIFORNIA BEARING RATIO TEST

TP-4

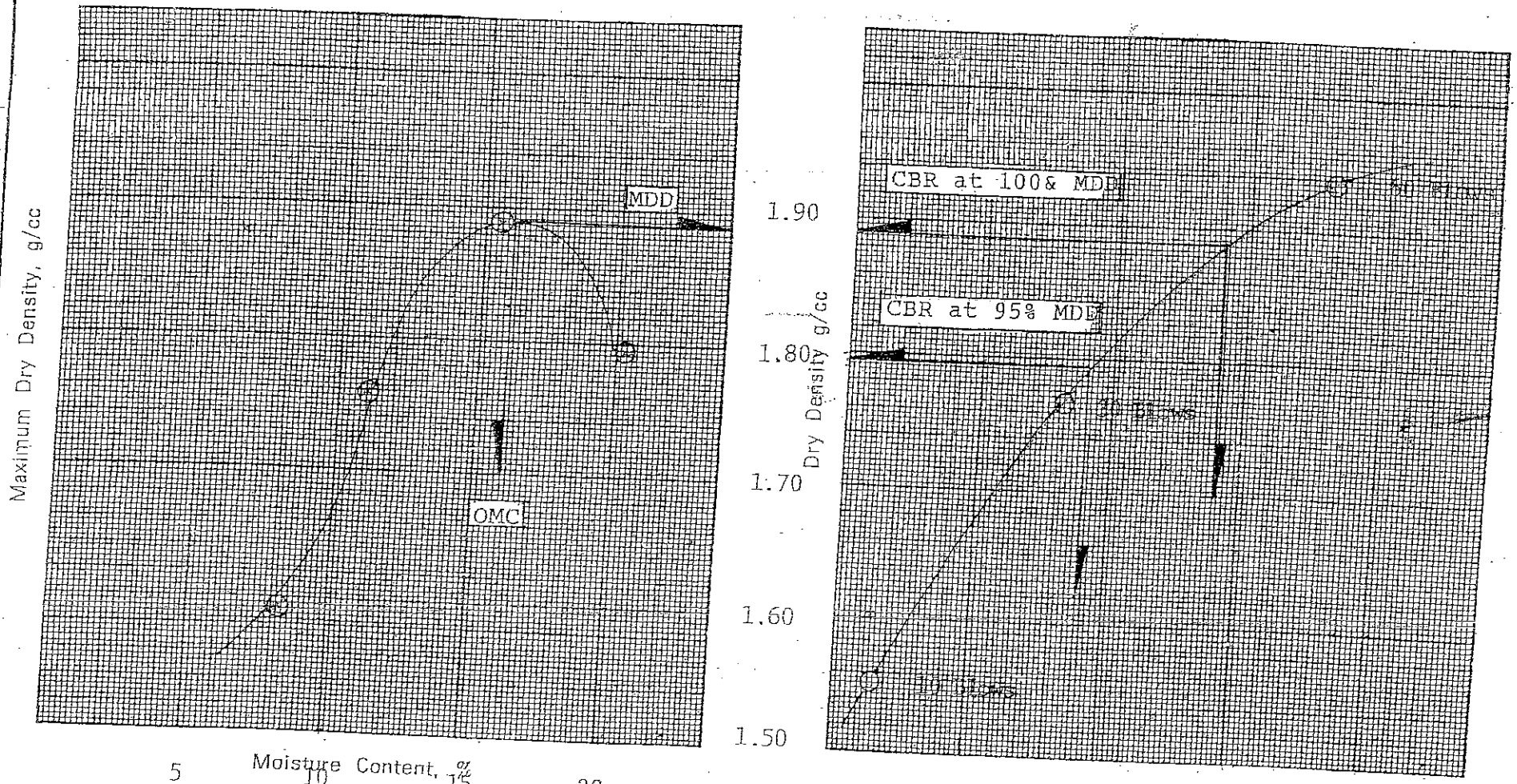
0.2 - 1.5m

Maximum Dry Density, g/cc = 1.89

Optimum Moisture Content, % = 16.0

CBR VALUE at 100 % MDD: = 57

CBR VALUE at 95 % MDD: = 37



L. C. Hernandez
TESTED BY: Materials Technician

C. P. Cruz
CHECKED BY: Materials Engr. IV

O. A. Manigos
NOTED BY: Manager-Geotech

INDUSTRIAL INSPECTION (INTERNATIONAL), INC.
CONTRACTOR"S LICENSE NO. 3774 (GEN. ENG'G & BLDG.) • MCC P.O. BOX 1071 PHILIPPINES
Second Floor, MJL Building, 1175 Chino Roces St., Makati, Metro Manila
Tel. Nos. 815-96-29; 815-93-01 to 08 loc 29

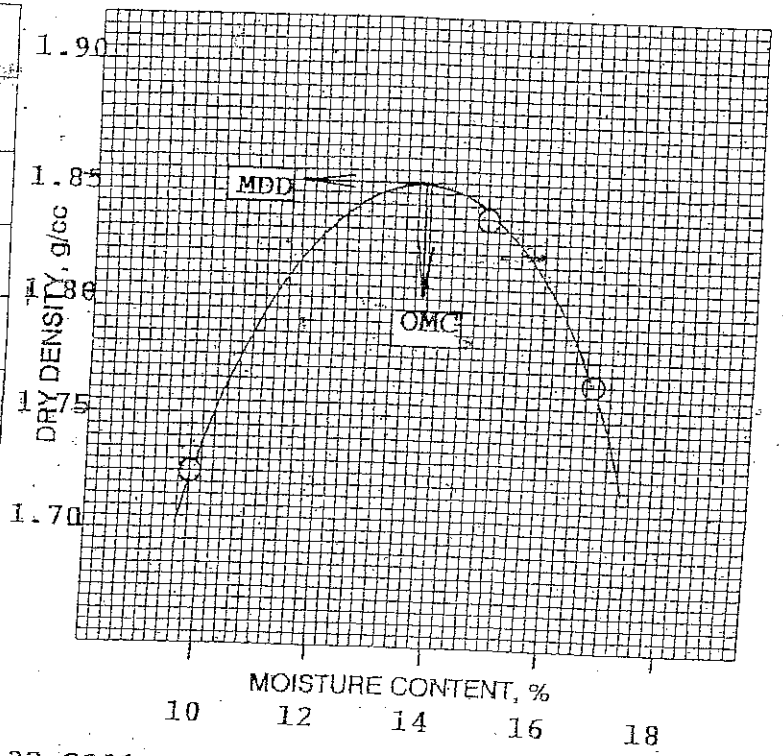
TEST REPORT NO.MDR- 0322 LIG

LABORATORY SOIL COMPACTION TEST

PROJECT: Proposed Panglao ~~Airport~~	SAMPLE NO. TP-5
LOCATION: Panglao, Bohol	DEPTH: 0.30-1.50

DATA:

TRIAL NUMBER	1	2	3	4	5	6
Water added, cc.	200	400	600			
wt. of wet soil g.	4018	4473	4370			
Wet Unit Weight, g/cc	1.894	2.108	2.060			
Water content, %	9.82	14.80	16.67			
Dry unit weight, g/cc	1.725	1.836	1.766			



Method: ASTM D 1557

Tested By: E.R. CLEMENTE
Mat'ls. Tech.

Checked By: D.S. MACATANGAY
Mat./s. Eng'r./IV

Noted By: V.C. EDUARDO
AVP-Prov'l. Operation

Date Tested: Jan. 22,2001

Date Reported: Jan. 23,2001

MDD- 1.850g/cc

OMC- 13.70%

CONTRACTOR'S LICENSE NO. 3774 (GENERAL ENGINEERING) • MCC P.O. BOX 1071 PHILIPPINES

TEST REPORT NO.: CBR 0081 LTG

TP - 5 (0.30-1.50m.)

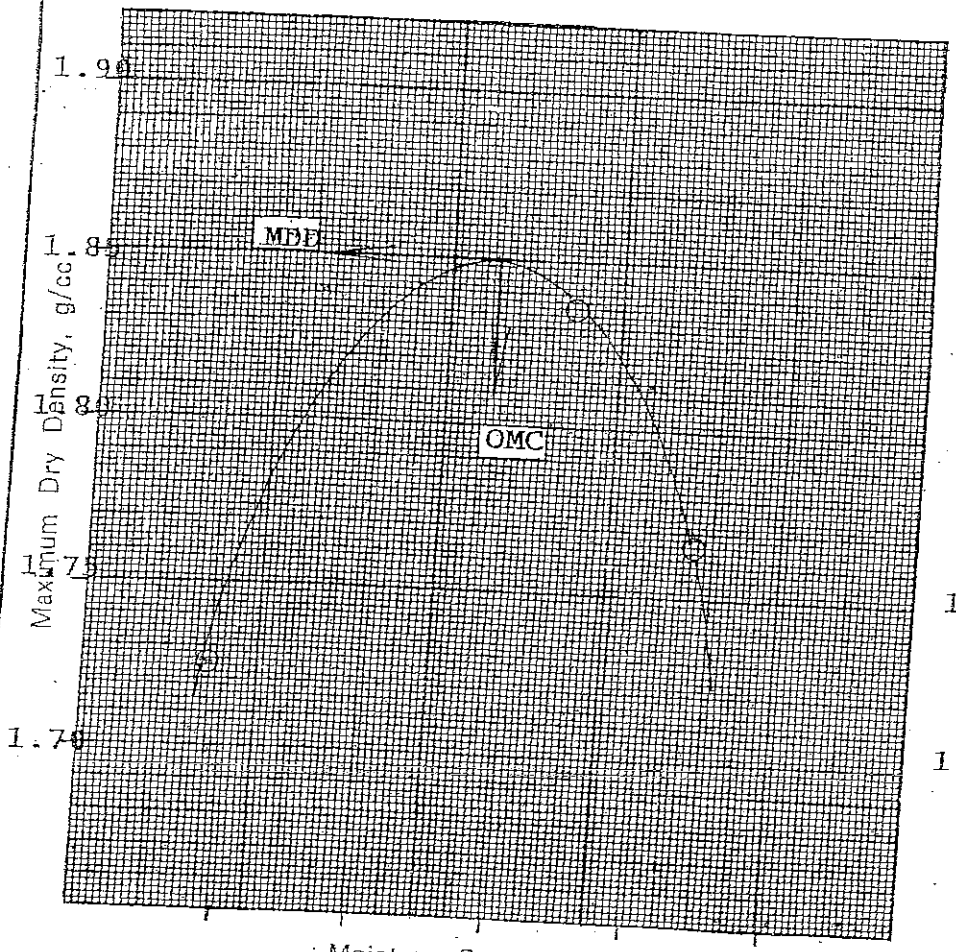
CALIFORNIA BEARING RATIO TEST

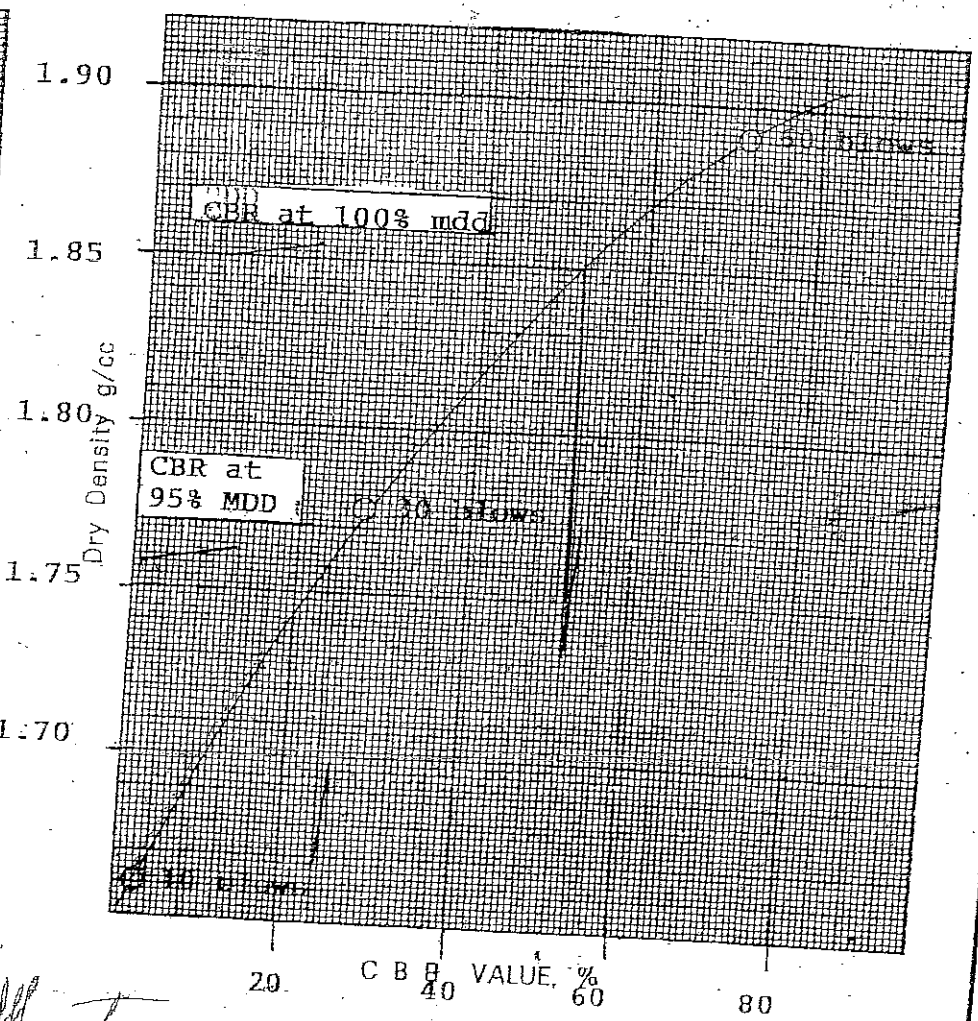
Maximum Dry Density, g/cc 1.850

Optimum Moisture Content, % 13.70

CBR VALUE at 100 % MDD: 52

CBR VALUE at 95 % MDD: 24





TESTED BY: E.R. CLEMENTE Mat'ls. Tech.

CHECKED BY: D.S. MACATANGAY Mat'ls. Eng'r. IV

NOTED BY: V.C. EDUARDO AVP-Prov'l. Operati-

INDUSTRIAL INSPECTION (INTERNATIONAL), INC.

CONTRACTOR"S LICENSE NO. 3774 (GEN. ENG'G & BLDG.) • MCC P.O. BOX 1071 PHILIPPINES
Second Floor, MJL Building, 1175 Chino Roces St., Makati, Metro Manila
Tel. Nos. 815-96-29; 815-93-01 to 08 loc 29

TEST REPORT NO.MDR- 0321 LIG

LABORATORY SOIL COMPACTION TEST

PROJECT: Proposed Panglao Airport

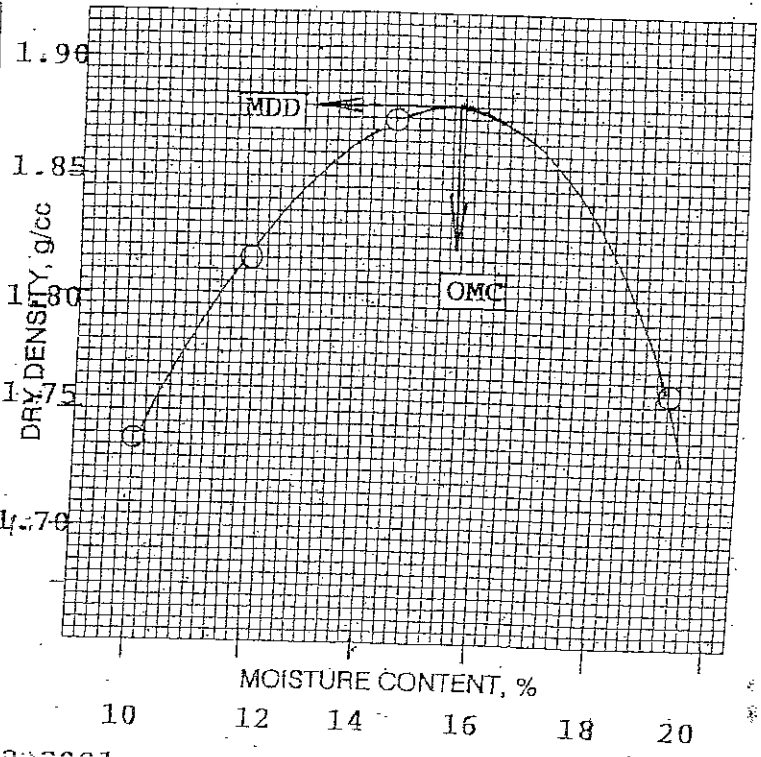
SAMPLE NO. TP-6

LOCATION: Panglao, Bohol

DEPTH: 0.20-1.50m.

DATA:

TRIAL NUMBER	1	2	3	4	5	6
Water added, cc.	200	400	600	800		
wt. of wet soil g.	4056	4304	4550	4451		
Wet Unit Weight, g/cc	1.912	2.029	2.145	2.098		
Water content, %	10.00	11.82	14.40	19.20		
Dry unit weight, g/cc	1.738	1.815	1.875	1.760		



Method: ASTM D 1557

Tested By: E.R. CLEMENTE
Mat'ls. Tech.

Date Tested: Jan. 22,2001

Checked By: D.S. MACATANGAY
Mat'ls. Eng'r. IV

Date Reported: Jan. 23,2001

MDD - 1.880 g/cc
OMC - 15.50 %

Noted By: V.C. EDUARDO
AVP-Prov'l. Operation

CONTRACTOR'S LICENSE NO. 3774 (GENERAL ENGINEERING) • MCC P.O. BOX 1071 PHILIPPINES

TEST REPORT NO.: CBR 0059 LTG

TP-6 (0.20-1.50m.)

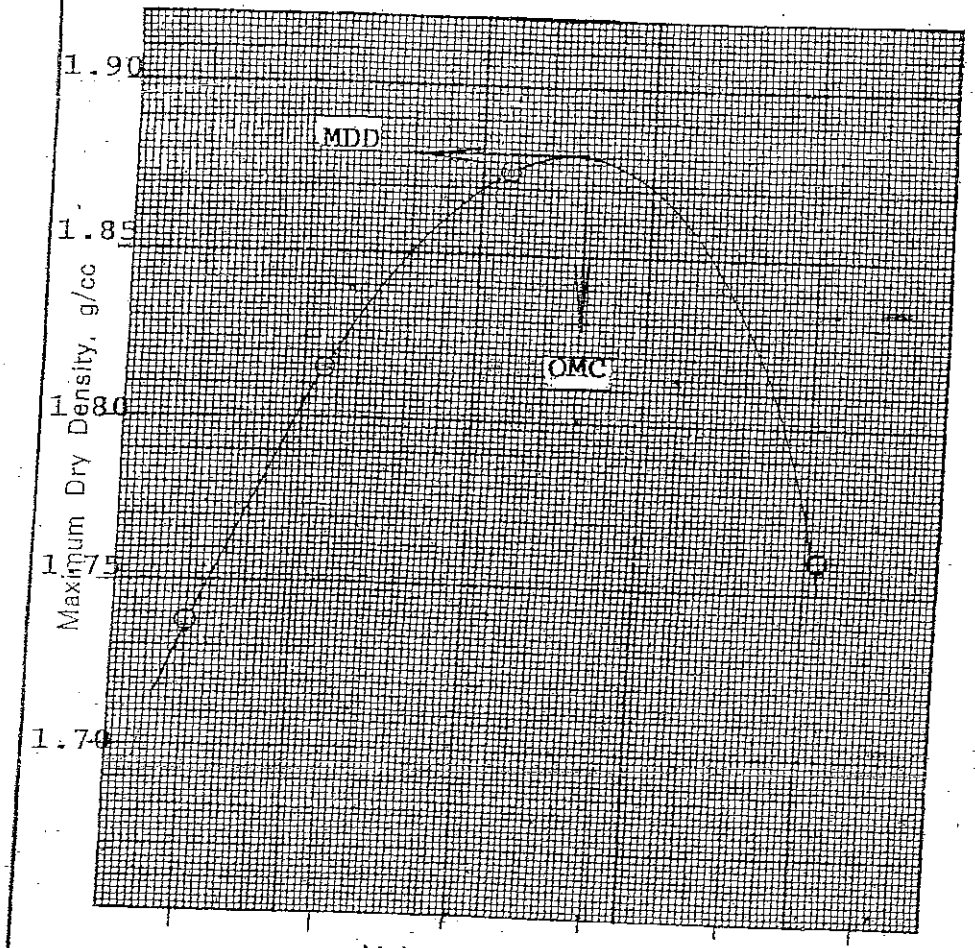
CALIFORNIA BEARING RATIO TEST

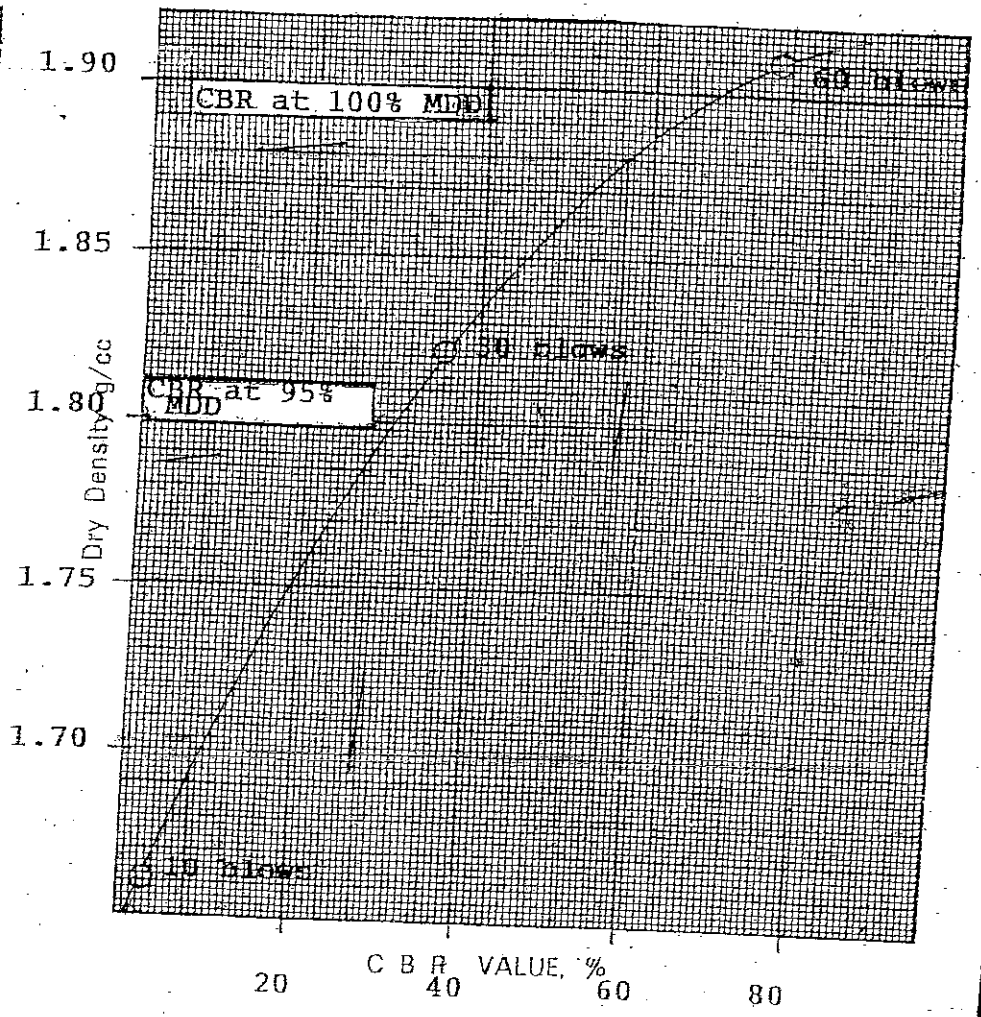
Maximum Dry Density, g/cc 1.880

Optimum Moisture Content, % 15.50

CBR VALUE at 100 % MDD: 57

CBR VALUE at 95 % MDD: 28





TESTED BY: E.R. CLEMENTE
Mat'ls. Tech

CHECKED BY: D.S. MACATANGAY
Mat'ls. Eng'r. IV

NOTED BY: V.C. EDUARDO
AVP-Prov'l. Operation

Project : PROPOSED AIRPORT

Location : PANGLAO, BOHOL

Subject : SPECIFIC GRAVITY TEST RESULTS
(Standard Penetration Test Soil Sample)

Borehole No.	SPT No.	Results
1	1	2.39
2	2	2.71
3	9	2.70
4	1	2.33
5	1	2.47
6	1	2.38
7	3	2.50

---------- nothing follows ----------

Project : **PROPOSED AIRPORT**

Location : **PANGLAO, BOHOL**

Subject : **SPECIFIC GRAVITY TEST RESULTS (Test Pit Soil Sample)**

Test Pit No.		Depth (meter)		Results
TP-1	-	0.0-0.30	-	2.43
TP-2	-	0.41-1.50	-	2.56
TP-3	-	0.0-0.30	-	2.42
TP-4	-	0.20-1.50	-	2.52
TP-5	-	0.0-0.30	-	2.59
TP-6	-	0.20-1.50	-	2.48

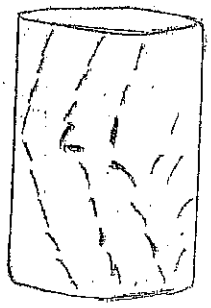
---------- nothing follows ----------

CLIENT : TCGI ENGINEERS

PROJECT : PROPOSED CENTRAL VISAYAS, PANGLAO AIRPORT

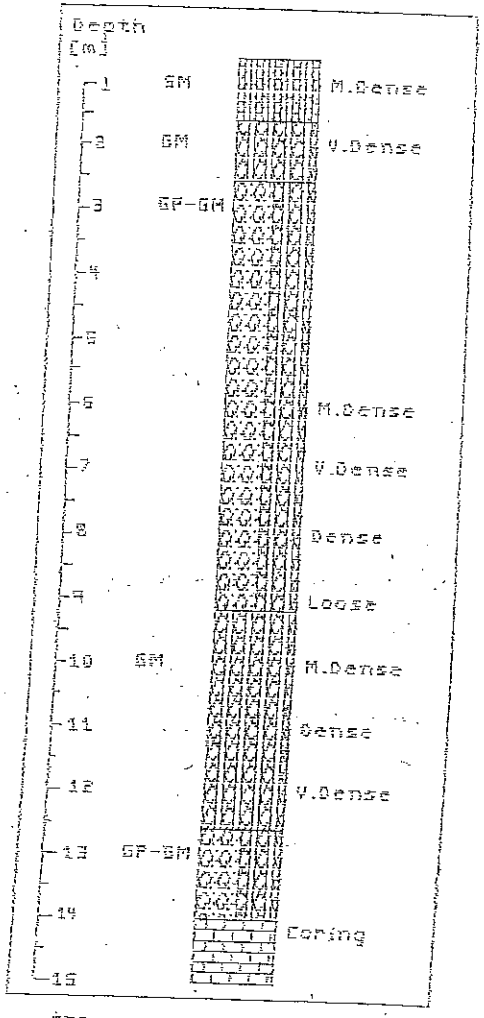
UNCONFINED COMPRESSIVE STRENGTH

Diameter, (cm)	-	3.50
Height	-	7.00
Area, cm^2	-	9.62
Moisture Content	-	2.10
Unit Weight (wet), g/cc	-	1.895
Unit Weight (dry), g/cc	-	1.856
Max. Compressive Strength, psi	-	838
kg/cm^2	-	59.06



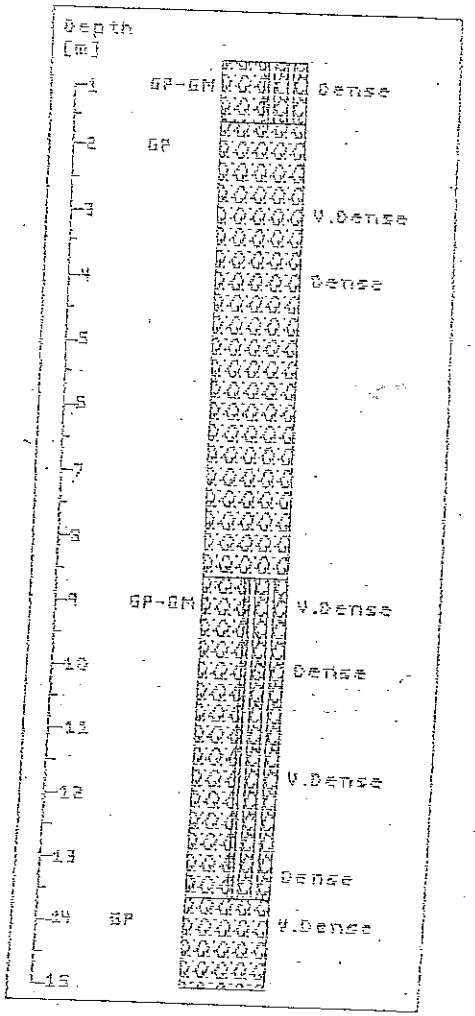
mode of failure

BH – 1



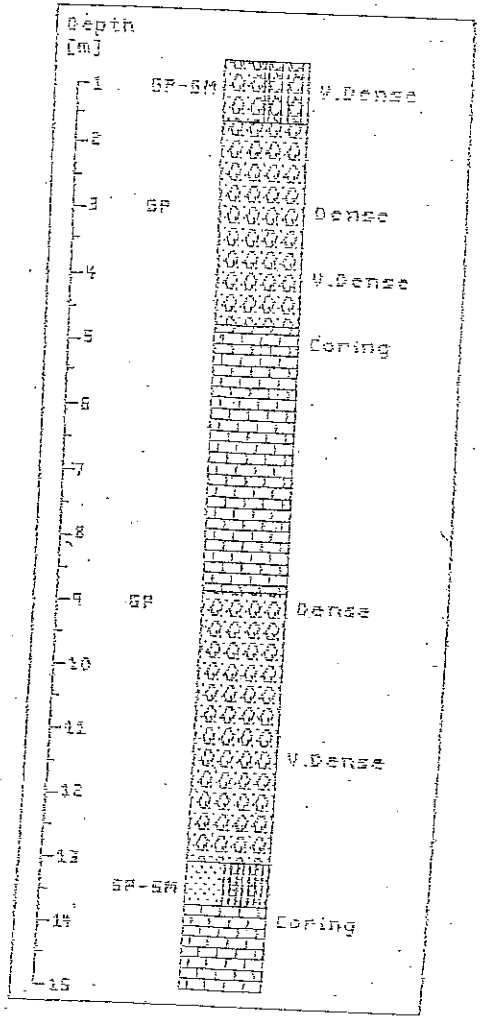
Water Level = 11.12m.

BH – 2



Water Level = 10.20m.

BH-3

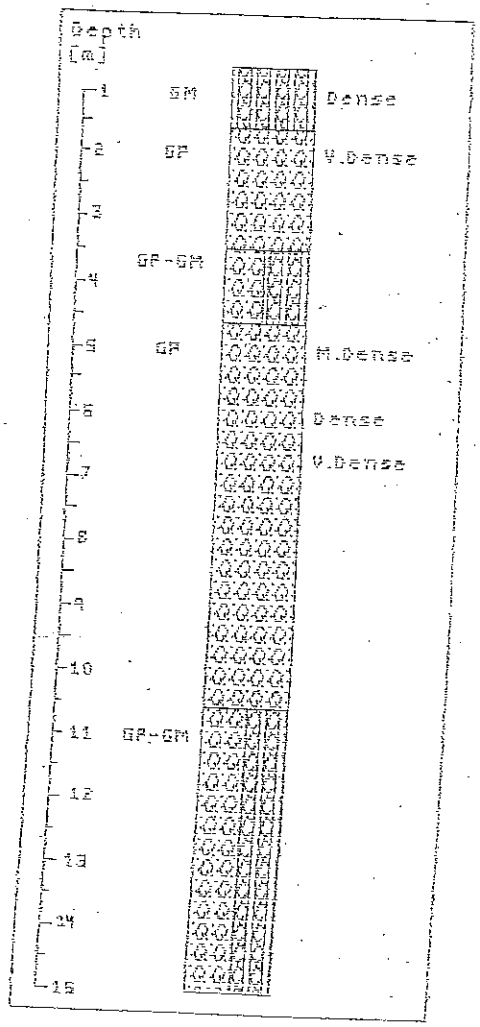


Water Level = 9.95

Sub-soil Profile

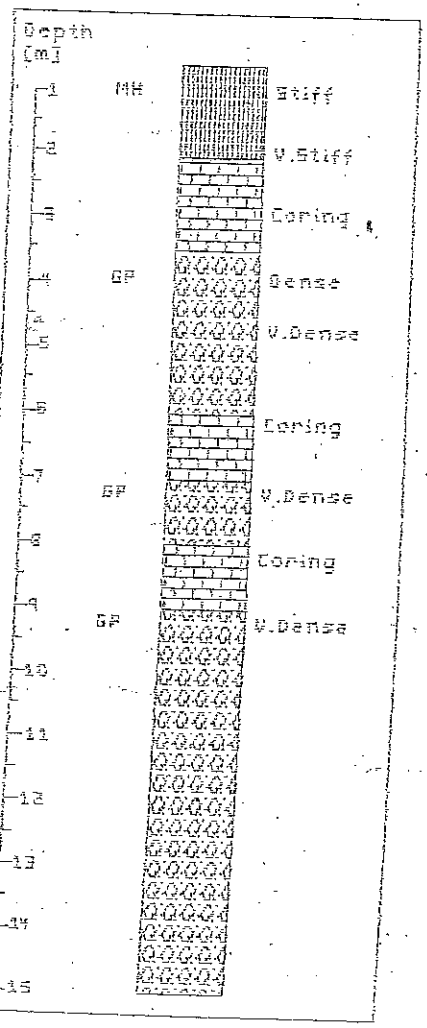
Proposed Airport, Panglao, Bohol

BH – 4



Water Level = 10.20m.

BH – 5

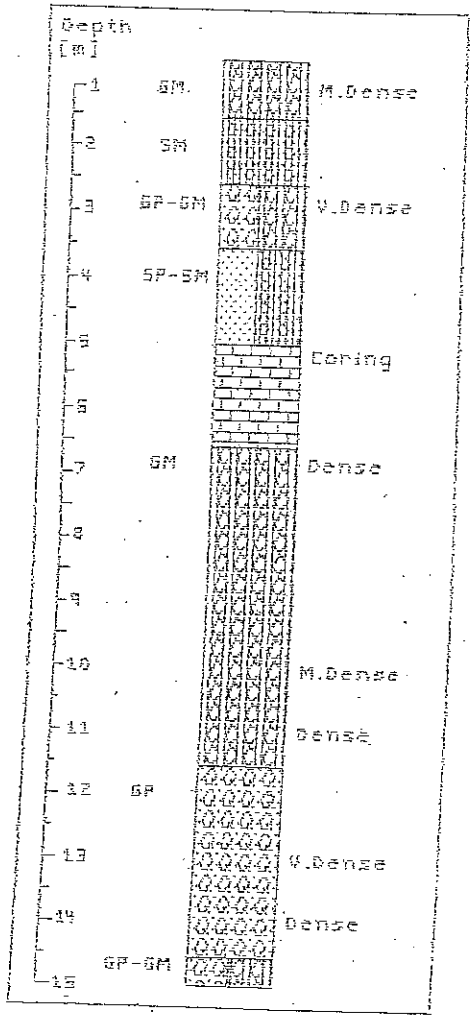


Water Level = 10.82m.

Sub-soil Profile

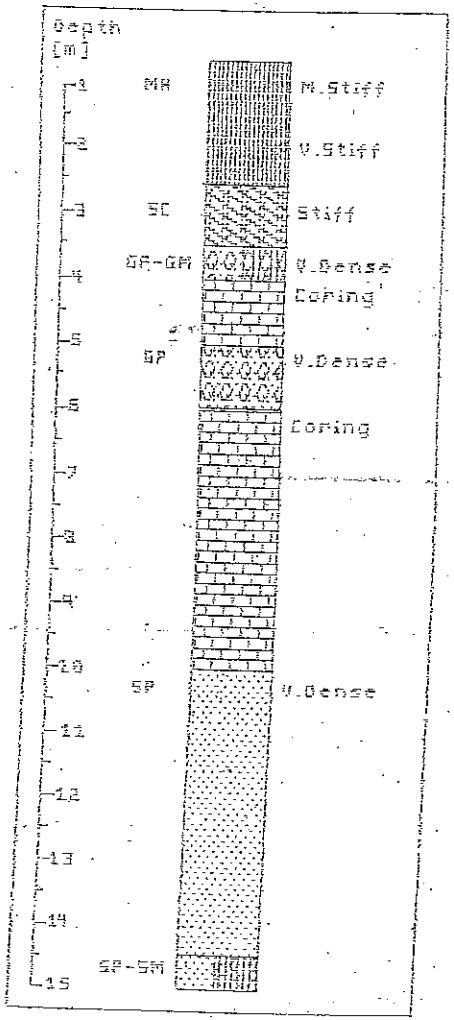
Proposed Airport, Panglao, Bohol

BH - 6



Water Level = 10.91m.

BH - 7



Water Level = 10.33m.

Sub-soil Profile

Proposed Airport, Panglao, Bohol

APPENDIX XII

WATER RESOURCES INVESTIGATION & GEO-RESISTIVITY SURVEY FOR THE PROPOSED PANGLAO AIRPORT

TABLE OF CONTENTS

1.0 GENERAL 1

2.0 DESCRIPTION OF THE STUDY AREA 3

2.1 Location 3

2.2 Physiography 3

2.3 Climate 4

2.3.1 Rainfall 4

2.3.2 Temperature 4

2.3.3 Evapotranspiration 4

2.4 Geology 5

3.0 SURFACE WATER 5

4.0 GROUNDWATER RESOURCES 6

4.1 Water Point Inventory 6

4.2 Hydrogeology 7

4.3 Geo-physical Investigation 8

4.3.1 General 8

4.3.2 Geo-electric Resistivity Survey 9

4.3.3 General Principle and Methodology 9

4.3.4 Equipment 10

4.3.5 Interpretation 11

4.3.6 Discussion of Results 12

5.0 SEAWATER INTRUSION 13

6.0 WATER QUALITY 15

7.0 RECOMMENDATION 16

LIST OF TABLES

1 Climatological Data

2A Well Data Summary - Panglao Island

2B Well Data Summary - Tagbilaran City

4 Deduced Resistivity Values
5 Water Quality Test Results

LIST OF FIGURES

1 Study Area Location Map
2 Average Monthly Rainfall and Temperature
3 Average Monthly Rainfall and Evapotranspiration
4 Geologic Map
5A Well Location Map - Panglao Island
5B Well Location Map - Tagbilaran City
6 GRM - 300 Control Panel
7 Geo-resistivity Survey Location Map
8 Electro-stratigraphic Section A - A' (Panglao)
9 Electro-stratigraphic Section B - B' (Dauis)
10 Proposed Wellsite Location Map
11A Preliminary Well Design - Panglao
11B Preliminary Well Design - Dauis

1.0 GENERAL

Most of the residents of Panglao Island in Bohol Province obtain their water supply from shallow drilled and dug wells which are equipped with either small-capacity electrically-driven pumps or with simple pole-and-bucket instruments. In other barangays, water is obtained from hand-pump wells constructed by the Department of Public Works and Highways. Some of the existing sources particularly those wells drilled near the coastline have poor water quality. The available groundwater for withdrawal in Panglao Island has been estimated at 33,562 cumd. Based on the population and water demand of existing population, the groundwater still available for withdrawal in Panglao Island in Year 2010 is 25,083 cumd.

The Dauis Poblacion and adjacent barangays are served by a Level 3 water supply system with water coming from wells drilled in Barangays Tutolan, Catarman, and Macayabac and from the Provincial Public Utility Department (PPUD) well in Tagbilaran City. The Panglao Poblacion is also served by a Level 3 water supply system in Barangay Lourdes with dug well as water source installed with submersible pump. At present, the existing waterworks systems are not capable of supplying the residents with reliable water supply. Water quality particularly in Panglao is high in chloride content. To support the water requirements of the island, implementation of a comprehensive water supply project is necessary.

Tagbilaran City is served both by the Provincial Public Utilities Department (PPUD) and the Tagbilaran City Water System (CWS). The PPUD operates and maintains ten (10) wells which supplies most of the water requirements of the city proper including the Tagbilaran Airport. The TCWS on the other hand operates and maintains four (4) wells which supplies part of the water requirements of Tagbilaran City, particularly outside the city proper.

The Loboc River has been identified as the long-term water supply source for Dauis, Panglao and eight other municipalities including Tagbilaran City. Loboc River is located in the Municipality of Loboc, some 29 km from Tagbilaran City. At the gauging station located in Barangay Tigao, Loboc, Bohol, the river has a drainage area of 618 sq km. The extreme maximum flow measured on

November 19, 1964 was 571 cms while the extreme minimum flow measured on July 3, 1963 was 3.90 cms. Bidding for a joint venture water supply project with a private group has been initiated by the Provincial Government of Bohol and final negotiations with the lowest bidder is on-going..

The findings and evaluations of the investigations carried out in connection with determining the immediate water source for the airport development program in Panglao Island points to groundwater through wells as immediate water supply source. Drilling of wells that will tap the shallow freshwater aquifer system is expected to support the water requirements of the airport. Limit on drawdown must be exercised to avoid upconing of the saline water. Production of 1.5 - 2.0 lps is expected from a well drilled in the recommended sites for well drilling.

Data that were used in the water resources study were obtained from existing reports and studies and through additional investigations and field works. The following were the sources of information:

- Water Supply, Sanitation and Sewerage Sector Master Plan for Bohol Province (W4SMP), Financed by UNDF, through the Swedish Fund for Consultancy Services.
- Tagbilaran Master Plan - Central Visayas Water and Sanitation Project.
- Philippine Water Resources Summary Data - National Water Resources Board.
- Water Supply Feasibility Study for the Municipality of Dauis - WATCON, Inc.
- Drilling reports of the Department of Public Works and Highways (DPWH) of Tagbilaran City;
- Bureau of Mines and Geosciences (BMG) reports and maps;
- National Mapping and Resource Information Authority (NAMRIA) maps;

- Philippine Atmospheric Geophysical Astronomical Services Administration (PAGASA) meteorological data;
- Information supplied by local residents and officials; and
- On-site geologic reconnaissance survey; well inventory and conduct of geophysical investigations.

2.0 DESCRIPTION OF THE STUDY AREA

2.1 Location

The study area, as will be used in the succeeding discussions, covers Panglao Island which is composed of the Municipality of Dauis and the Municipality of Panglao. The island is located at the southwestern side of Bohol Province. It is about 15 km long and 7.5 km wide and is accessible from Tagbilaran City, the provincial capital by land transportation. The island is connected to the mainland by two (2) bridges.

Aerial coverage of the investigations, hereto defined as the study area, is the general region enclosed by north latitudinal coordinates 9° 32' to 9° 38' and east longitudinal coordinates 123° 43' to 123° 53'. Figure 1 shows the location of the study area.

2.2 Physiography

The Municipality of Dauis covers an area of 51.5 sq km and is composed of twelve barangays while the Municipality of Panglao covers an area of 40.1 sq km and is composed of ten (10) barangays. The island is almost entirely made up of coralline limestone with well developed karst features. From the coastline, elevation rapidly rises to 10 to 30 meters. Twin peaks in the eastern part of the island rise to 163 and 184 meters above mean sea level (mamsl), respectively. Large areas of the island are flat terrain with slope of less than 3% and are covered with residual soil and coralline limestone. Some of the areas are hilly with steep slopes particularly where limestone outcrops are visible.

The soil cover consists of Faraon and Bolinao Clay. The Bolinao Clay is characterized by brown, reddish brown to brick red surface, granular and friable with a depth of 15 - 25 centimeters. Because the terrain is generally flat and level, erosion is negligible.

There is no surface drainage in the whole island of Panglao except for a short drainage system originating between the twin peaks.

Agriculture and fishing are the main occupations of the municipality's population. The study area is planted mostly with coconuts, corn, bananas, fruit bearing trees and vegetables. Tourism and services related to tourism is expected to become an important factor in the municipality's economy under the Department of Tourism's (DOT) Panglao Island Development Project.

2.3 Meteorology

Climate in the area is classified under the fourth type according to Coronas Classification. This type is characterized by a more or less evenly distributed rainfall throughout the year and no pronounced wet and dry seasons. Climatological data from the PAGASA - Tagbilaran Station are presented in Table 1 and Figure 2.

2.3.1 Rainfall

The average annual rainfall in Tagbilaran City for the 35 year (1961-1995) period record is 1,332.7 mm. Monthly rainfall vary between 65.1 mm. and 183.20 mm. Peak precipitation (183.2 mm) is observed in November while the lowest value (65.1 mm) is observed in April. Table 1, presents the mean monthly rainfall in Tagbilaran City.

2.3.2 Temperature

The average monthly temperatures in Tagbilaran City are relatively constant as shown in Table 1. Mean monthly temperatures vary between 26.3°C and 28.5°C. The month of May is normally the warmest with an average temperature of 28.5°C while January is the coldest with an average monthly temperature of 26.3°C.

2.3.3 Evapotranspiration

Annual average evapotranspiration can be estimated using annual average rainfall and temperature data using the Turc Formula:

$$E_t = \frac{P}{[0.9 + (P/L)^2]^{1/2}}$$

where P = annual rainfall in mm

$$L = 300 + 25\ T + 0.05\ T^3$$

and T = annual mean temperature in ^oC

This equation was applied to the monthly precipitation and temperature in Tagbilaran City. The computed monthly evapotranspiration together with monthly precipitation are presented in Figure 3. The average annual evapotranspiration is estimated to be 1,157 mm. From the total annual rainfall of 1,332.7 mm, the available rainfall for both surface, sub-surface run-off and groundwater flow is 175.7 mm. Since the study area is covered mostly with sandy loam and corraline limestone percolation into the groundwater system is favored.

2.4 Geology

The whole island of Panglao is a typical raised limestone island. It is built of reef limestone and reef derived sediments deposited during the Late Tertiary to Early Quaternary period. Karst features are very common.

Maribojoc Limestone covers more than 95 % of the island with the remaining areas underlained with Quaternary Alluvium. The limestone is highly corraline, bedded to massive, soft, chalky, non-compact and marly. The limestone exhibits numerous sinkholes, caves and caverns which are product of chemical weathering of carbonate rocks. The Quaternary Alluvium consists of layers of mud, clay, silt sand and gravel and coral and shells deposits, along shores, swampy areas and beaches. The alluvial deposits overly the Maribojoc Limestone. The geologic units that can be found in the general area is presented in Figure 4 Geologic Map.

3.0 SURFACE WATER

There is no surface drainage system in the whole island of Panglao except for a short drainage system originating between the twin peaks and small ephemeral rivers and creeks draining into the sea. This indicates that almost all effective rainfall infiltrates into the ground.

Loboc River in Loboc town some 29 km sotuhwest of Tagbilaran City has been identified as potential surface water source that can support

the water demand of Tagbilaran City and nine (9) adjoining municipalities. In Barangay Tigao, where the gauging station is located, the river drains an area of 616 sq km.

From the Philippine Water Resources Summary Data Report of the National Water Resources Board, records of flow were obtained. Mean monthly discharge ranges from 8.6 - 20.9 cums while maximum and minimum extreme discharge were measured at 571.0 cums and 3.9 cums.

4.0 GROUNDWATER RESOURCES

Groundwater in the area is used through shallow drilled and dug wells. Water usage is primarily for domestic purposes. Because of the problem on water quality some residents rely from water vendors for their drinking water needs.

4.1 Water Point Inventory

A comprehensive well inventory was undertaken in Panglao Island by the Provincial Government of Bohol in cooperation with SWECO, Consulting Engineers of Sweden in 1998 as an integral part of the Water Supply, Sanitation and Sewerage Sector Master Plan for Bohol Province.

A total of 617 wells were located in Panglao Island; 231 wells in Dauis and 386 wells in Panglao. The 169 wells are public and the 448 are private wells. The 616 wells were drilled in the Maribojoc Limestone. The 503 wells are either shallow or open dug wells. This indicates predominantly shallow aquifer exist in the island and/or poor water quality at greater depth. The deepest well is located in Barangay Mariveles at an elevation of 60 meters above mean sea level, drilled to 80 meters below ground or to about 20 meters below mean sea level. The 235 wells are operational and utilized for drinking purposes.

Wells drilled near the coast show that water is saline while those wells drilled at the center and at the southwestern part of the island show lower electrical conductance.

During the water resources investigations, an inventory of existing water sources was made. The inventory consisted of locating

productive wells near the Alternative 1 and Alternative 2 sites. Water samples were also collected to determine the physical and chemical characteristics of groundwater in the area. Summary of well information gathered in Panglao Isalnd is presented in Table 2A Well Data Summary while locations of the selected wells are presented in Figure 5A Well Location Map.

Most of the wells were drilled to 5 - 24 meters below static water level to prevent pumping of saline water. The drilled wells are provided with 100 to 200 mm casings and are installed with 1.5 - 5 hp submersible pump, with capacity of 1 - 5 lps (15 - 48 gpm) while the dug wells are commonly installed with culvert 1200 mm culvert pipes. The penetrated strata consisted of limestone formation. There is no available record however on actual withdrawal and no test pumping results are available. Reconstruction of the study area's aquifer geometry could not be made at present due to limited number of wells with stratigraphic logs and more often the logs are limited to shallow depths.

Data of operational Provincial Public Utility Department and Tagbilaran City Water Supply wells were also collected during the study. Well Data Summary is presented in Table 2B while Well Location Map is shown in Figure 5B. Some of the PPUD wells drilled near the coastline have been abandoned due to saline water intrusion.

Wells in Tagbilaran City are drilled to 48.8 - 70.1 meters and installed with 150 mm to 300 diameter casings. Withdrawal from these wells ranges from 1.99 - 13.93 lps. The wells have specific capacity ranging from 0.7 - 5.0 lps per meter of drawdown, indicating medium to good aquifer yielding properties.

4.2 Hydrogeology

The Maribojoc Limestone which covers most of the Panglao Island, when composed of coralline reef and reef sands is highly porous and forms the main water table aquifer in the island. Limestone's permeability is very high and run-off is practically non-existent in this formation, as indicated by poorly developed drainage network.

The depth to groundwater level in the island varies depending on the location. It is closer to the surface near the coast and deeper farther

LEGEND :

Study Area

0 1,000 2,000 3,000

SCALE : 1 : 50,000 METERS

STUDY AREA LOCATION MAP

FIGURE 1

WATCON, INC.

inland and in the hilly portions of the island. The groundwater divide follows the topographic divide, located along the island's long axis. Groundwater flow is toward northwest and southeast from the island's long axis.

The groundwater recharge in Panglao Island has been estimated in the Water Supply and Sewerage Sector Master Plan for Bohol Province at 191 mm/year per sq m. This is about 14.3 % of the average annual rainfall, which is an acceptable value for permeable formations including coralline limestone. The total recharge over the island is about 47,945 cumd. In principle, 100 % of recharge into aquifer underlying a small island can never be fully recovered, by wells equipped with motor driven pumps. This is due to danger of saline water intrusion near the coast and upconing of saline water into wells located farther inland. By taking into consideration that only 70 % of recharge can be recovered or sustained, the total recoverable recharge is estimated at 33,561 cumd.

The greater thickness of freshwater lense at the island's center provides possibility for construction of small capacity wells. The safe well depth should be investigated through geo-resistivity survey. Discharge rate that will allow minimal drawdown should be observed to prevent upconing of the saline water.

4.3 Geo-physical Investigation

4.3.1 General

To supplement the information available on the hydrological conditions in the study area, the consultant performed geo-electric resistivity survey in Panglao Island. Reference was also made to the geo-resistivity survey conducted in 1996 for Water Supply Feasibility Study for Dauis.

Geo-physical prospecting is one of the investigation tools used before well construction is pursued to obtain information on the character of formations and chemical characteristics of groundwater. Regardless of the geo-physical prospecting methods used, the efficacy of each method relies on the contrasting physical properties of the various earth materials and the chemical properties of the contained water. Enough natural contrast usually exist between layers so that their general characteristics can be determined.

Geo-physical survey results provide information on the stratigraphy and structure of the local geologic environment as well as aquifer characteristics. It gives an indirect evidence whether the sub-surface formations indicate presence of exploitable groundwater. The geo-physical method of prospecting is utilized in evaluating the type of sub-surface formations with the purpose of locating well sites with greater confidence. These result to substantial savings through the reduction of expenditures required for exploration drilling and provision of information within a relatively short time.

4.3.2 Geo-electric Resistivity Survey

Among the various geo-physical prospecting methods, electrical resistivity sounding is the most widely used for groundwater investigation. It provides a quantitative measure of the conducting properties of the earth materials. Because various types of sub-surface materials generally exhibit characteristic values of resistivity (or its inverse property, conductivity), strata of differing materials can be identified; i.e. generally high resistivity sands, gravel and sandstone (usually water bearing) may be differentiated from poor groundwater beds of low resistive clays and shales. As electrical conductivity or resistivity is also a function of the content of dissolved minerals in rocks, sub-surface salinity can also be detected. Thus, a broad spectrum of results can be obtained, among which are:

- indication of rock types;
- estimate of the thickness of different layers;
- identification of potential aquifers;
- spatial correlation of different layers and;
- estimation of depth of saline/fresh water interface.

4.3.3 General Principle and Methodology

The ability of a geologic rock unit to conduct an electrical current depends on three factors: the amount of open space between particles (porosity), the degree of interconnection between those open spaces and the volume and conductivity of the water in the pores. The presence of water and its chemical character are the principal

controls on the flow of the electric current because most rock particles offer high resistance to electric flow. Thus, resistivity decreases as porosity, hydraulic conductivity, water content and water salinity increase. Clay and shale have low resistivities and dry sand and gravel have higher resistivities than do saturated sand and gravel.

Field survey is performed using an instrument that is stationed at the middle of four electrodes inserted into the ground . An electric current is passed into the ground by means of a power unit source through pairs of electrodes from which resulting electric fields are measured. A series of measurements is accomplished by varying the distance between electrodes, which produces variable depths of penetration of current. The depth of electrical penetration is governed by the spacing of electrodes; the larger the separation, the deeper the penetration. The electrode spacing is progressively increased to determine the variation in resistivity with depth.

4.3.4 Equipment

The Geo-Resistivity Meter (GRM) 3000, an Italian made instrument was used for measuring the resistivity of the earth. The instrument has been designed for deep investigation and allows fast and accurate measurements even if field conditions are unfavorable: i.e., very resistive soil and very conductive deep layers, variable disturbing potential. Figure 6 shows the control panel of the instrument.

- The maximum current electrode separation, AB for this investigation was 500 meters allowing for about 200 meters penetration into the sub-surface.
- Schlumberger configuration was utilized.
- Master and auxiliary curves were utilized in the interpretation of the field graphs.

The apparent resistivity is computed for every set of AB and MN expansion using the formula:

$$P_a = \frac{KV}{I}$$

where: $K = \frac{3.1416\,[(AB/2)^2 - (MN/2)^2]}{MN}$

and P_a = apparent resistivity (ohm meter)

V = potential drop (mV)

I = applied current (mA)

K = constant

AB = distance between electrodes A and B

MN = distance between electrodes M and N

3.3.5 Interpretation

The field data gathered were plotted on transparent double log paper using half the electrode spacing (AB/2) as abscissa and the computed apparent resistivities (P_a)as the ordinate. The resulting field curves were then superimposed on standard graphs by curve matching technique using standard graphs (Orellana and Mooney) to determine the true resistivity and thickness of the electro-stratigraphic sequence. Summary of the interpreted true resistivity and the corresponding thickness are presented in Table 3, Deduced Resistivity Values.

For the interpretation of the lithology, conductivity of the contained water and degree of water saturation, the ranges of resistivity values used are as follows:

20 - 50 ohm-m	clay and marls, unsaturated
50 - 200 ohm-m	limestone with clay, unsaturated
600 - 2,000 ohm-m	limestone, unsaturated or dry
0.3 - 5 ohm-m	clay and marls saturated with saline water
0.5 - 10 ohm-m	limestone with saline water
50 - 800 ohm-m	limestone with fresh water

4.3.6 Discussion of Results

A total of six (6) Vertical Electrical Sounding (VES) points were completed during the survey. Figure 7 shows the locations of the sounding points.

Geo-resistivity results indicate the presence of saline water beneath the island at varying depths. Generally, a thick fresh water lens was observed between the two peaks and a shallow fresh water lens was observed particularly at the northwestern part of the municipality. Table 3 presents the deduced resistivity values and depths of different layers for each of the VES. Generally, three (3) layers can be described from these sections. These sections show true resistivities, thickness and extent of each layer which are discussed below:

Panglao Area (Figure 8)

- The uppermost layer is a low to high resistive zone having resistivity values 34 - 460 ohm-meter and thickness of less than 1.2 meters. The low resistivity values correspond to the unsaturated covering layer consisting of residual topsoil and clayey limestone while the high resistivity values correspond to the unsaturated coralline limestone.

- Underneath the covering layer is a high to very high resistive zone with resistivity values of 300 - 1,750 ohm-meter. This section is interpreted to consist of unsaturated coralline limestone. Thickness of this layer is 4.8 - 13.9 meters.

- The third layer is a low to medium resistive section with resistivity values of 31.4 - 85.0 ohm-meter. These values correspond to clayey to marly coralline limestone saturated with freshwater. Thickness of this layer is 33.6 - 75.0 meters.

- The last layer is a very low resistive zone with resistivity values of less than 1 ohm-meter. It is interpreted to consist of saline intruded limestone formation.

Dauis Area (Figure 9)

- The uppermost layer is high resistive zone having resistivity values 150 - 205 ohm-meter and thickness of less than 1.3 meters. The resistivity values correspond to the unsaturated covering layer consisting of residual topsoil and clayey limestone.

- Underneath the covering layer is a very high resistive zone with resistivity values of 307 - 1,050 ohm-meter. This section is interpreted to consist of unsaturated coralline limestone. Thickness of this layer is 5.3 meters.

- The third layer another high resistive section with resistivity values of 533 - 750 meters. These values correspond to coralline limestone saturated with freshwater. Thickness of this layer is 33.6 - 33.8 meters.

- The last layer is a very low resistive zone with resistivity values of less than 10 ohm-meter. It is interpreted to consist of saline intruded limestone formation.

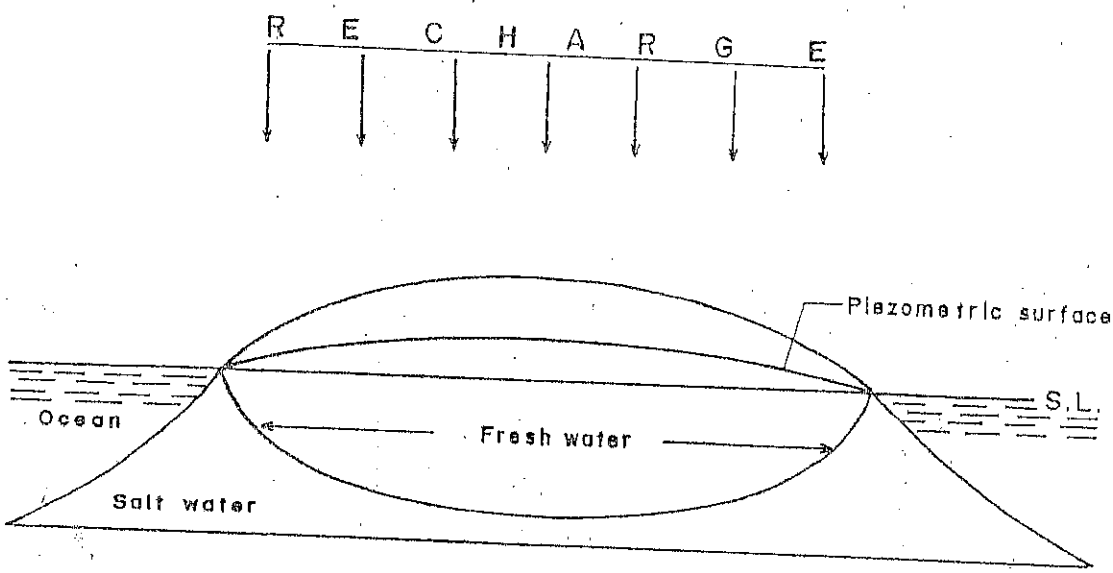
The potential aquifers in the area may be inferred from the results of the geo-resistivity survey and information from existing wells in the area. The third layer which exhibits high to very high resistivity values is the potential aquifer layer in the area. Also, geo-resistivity results show that the thickness of the freshwater lens is greater at the Alternative 1 airport site when compared with the results obtained at Alternative 2 airport site.

5.0 SEAWATER INTRUSION

Seawater intrusion takes place where groundwater reservoir is not protected by a cover of impervious rocks which would otherwise prevent the contact between fresh and saltwater along the shore line and offshore.

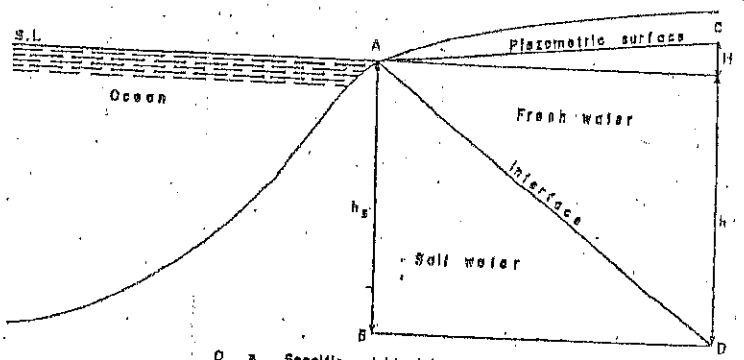
Where the aquifer is more or less widely in contact with sea, fresh water discharges into the sea and so the seawater, which is denser, intrudes below the fresh water. Therefore, two bodies of water exist, with fresh water floating on saltwater.

The simplest example shown below represents an island consisting of permeable rocks. The recharge is derived from infiltration of meteoric water and when this is not sufficient to maintain a thick water lens all the fresh water floats on saltwater.



In reality however, steady flow does not exist because small variations of the conditions of dynamic equilibrium continuously occur due to seasonal recharge, tidal oscillations, variability of exploitation rates during the year, etc.

The depth of the fresh-saltwater interface is given in its simplest expression for static conditions, by the Law of Ghijben-Herzberg which is graphically shown below:



ρ = Specific weight of fresh water (=1)

ρ_s = Specific weight of salt water (= 1.025)

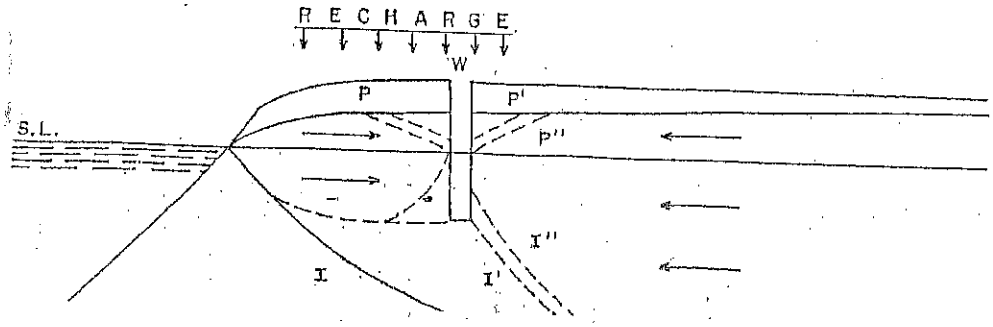
Pressure at B : $P_B = h_s (\rho_s)$

Pressure at D : $P = h_Q + H_Q$

$h = \frac{\rho}{\rho_s - \rho} H = \frac{1}{0.25} H = 40M$

The figure shows that for a given point the depth of the interface below sea level is in the order of 40 times the elevation of the piezometric surface. Since groundwater flows seaward, under dynamic conditions the interface is normally deeper than indicated by the Law of Ghijben-Herzberg. The landward extension of the seawater wedge is inversely proportional to the flow rate.

In a well pumping from a fresh water body floating on saltwater, the formation of the cone of depression causes upconing of the fresh-saltwater interface. Under static conditions the rise of the interface is about 40 times as much as the lowering of the piezometric surface and when the water level in the well is lowered to sea level, the seawater will also reach the same level after a relatively long period of time. This development is shown in the figure below where a well exploiting from a fresh water lens in the center of the island is shown.



For moderate exploitation, the original piezometric surface P is lowered to the position P' and the interface rises from the initial position I to the position I', and the well produces fresh water. For increased exploitation the cone of depression reaches the position P" with the apex at sea level. The interface rises to the position I" and the apex of the upconing also reaches. The well ceases its production of fresh water after having exploited 50% of the fresh water lens.

6.0 WATER QUALITY

Water samples from selected well sources in Panglao, Dauis and Tagbilaran City were collected during the investigation for water quality analyses. Water samples collected were sent to the laboratory for physical and chemical analyses.

Results of the laboratory analyses on water samples collected are shown in Table 4. Result of the water quality analyses of the Panglao Poblao Water System source in Barangay Lourdes indicate that except for total dissolve solids, hardness and chloride, all the values obtained are within the permissible limits set by the Philippine National Standard for Drinking Water. The same is true for the water sample collected from a deepwel source in Baramgay Tinago, Dauis, Bohol. Water sample from the Tiptip Well of the Tagbilaran City Water System shows better results as all parameters tested are within the permissible limits of the PNSDW.

7.0 RECOMMENDATION

Results of geo-electrical resistivity survey conducted in Panglao Island, indicate the presence of potential aquifers. For Alternative 1 airport site, the most feasible site for well drilling is in the vicinity of VES 2 while for Alternative 2 airport site the well can be drilled in the vicinity of VES 6. Figure 10 shows the locations of the recommended well sites. Well/s constructed in these areas are expected to produce good quality water.

In all of the foregoing proposed wells, proper design and construction procedures should be followed to ensure high well efficiency and optimum exploitation of the aquifers that will be penetrated by the wells. Installation of wire-wound stainless screens should be used for greater efficiency and minimal head losses.

The recommended well designs for Alternative 1 and Alternative 2 are presented in Figures 11A and 11B Preliminary Well Design. At Alternative 1 airport site, the well is proposed to be drilled by percussion method to 45 meters with borehole diameter of 300 mm for the installation of 150 mm blank casing and screens. Installation of wirewound stainless screens is recommended for greater efficiency and minimal head losses. At the Alternative 2 airport site, the well is proposed to be drilled to 35 meters.

Formation samples for every meter of penetration or more when changes of formation occur must be collected and identified by a qualified hydrogeologist who shall insure that all pertinent information with reference to drilling are properly collected and recorded. Conduct of preliminary testing is recommended to determine the available water with depth. The well should penetrate

10 meters below mean sea level and be pumped with drawdown of not more than 20 cm. A 2 hp pump submersible pump which can deliver 1.3 - 2.5 lps (20 - 40 gpm) at 30 - 50 meter head is recommended to be used during test pumping. Production of 108 cum per day can be achieved by pumping 1.5 lps (24 gpm) from the well source for 20 hours daily.

Sanitary seal of cement grouting on the annular space between the casing and the borehole should be provided to prevent contamination from surface pollutants. Likewise, water level sounding pipe should be installed for aquifer and pump testing that maybe necessary during future well efficiency evaluation.

For proper well maintenance, installation of gravel fill pipe is recommended for the purpose of refilling the gravel pack shroud.

The following is the well drilling procedure that must be followed:

1. Drilling of 300 borehole with formation samples collected every meter.
2. Conduct of preliminary pumping upon reaching the recommended depth of the well.
3. Conduct of down-the-hole geophysical logging.
4. Installation of blank casing and screens.
5. Gravel packing of annular space.
6. Development of well by surging and bailing and other acceptable methods.
7. Conduct of step-drawdown test to determine well efficiency and aquifer characteristics.
8. Conduct of continuous constant discharge test pumping.
9. Completion of well by installing well head cap, water level sounding tube, gravel fill pipe and cement grout.

Evaluation of test pumping results is recommended after completion of the first well to determine the quantity of groundwater that can be safely abstracted in the area. The results of pumping will be used to

determine the number of wells and spacing that will be necessary to support the future water requirements of the airport.

Like any other commodity of limited supply, groundwater is a resource that must be carefully managed. A monitoring program for groundwater data must be initiated. All wells should have facilities for measurement of the rate of production, water level and time of operation. These data should be recorded regularly on standard forms. Water samples for bacteriological and chemical analysis should be collected regularly to check on contamination and chemical content of the groundwater.

The data from the well monitoring program will provide information on the condition of the aquifer, decline of regional water level and early warning on deterioration of water quality and pump performance. With the available data, problems like overpumping of aquifer and pollution of groundwater can be predicted.

Also, in compliance with regulations on proper groundwater use and management, Water Rights must be secured from the National Water Resources Board and other concerned agencies.

TABLES

TABLE 1
CLIMATOLOGICAL DATA

Month	Rainfall (mm)	Temperature (°C)
January	100.2	26.3
February	69.4	26.4
March	69.7	26.9
April	65.1	27.9
May	76.4	28.5
June	122.1	28.3
July	118.6	28.1
August	108.4	28.4
September	130.0	28.2
October	171.6	27.8
November	183.2	27.4
December	118.0	26.9
Total	1,332.7	-
Average	111.1	27.6

Source: PAGASA - CLIMATOLOGICAL NORMALS
TAGBILARAN CITY STATION

Period of Records: 1961 - 1995

TABLE 2A
WELL DATA SUMMARY

Well No.	Location Owner/Barangay	Ground Elevation (m)	Well Type	Depth (m)	Casing Size (mm)	SWL (m bgl)	Water Column (m)
1	Epifanio Bongcac/ Barangay Danao, Panglao	4.00	Open Dug Well	20.00	1200	5.00	15.00
2	Public/ Barangay Looc, Panglao	6.00	Open Dug Well	18.00	1200	5.50	12.50
3	Lamberto Lopena/ Barangay Tangnan, Panglao	15.00	Deep Well	30.00	100	25.00	5.00
4	Lourdes Elementary School/ Barangay Lourdes, Panglao	25.00	Deep Well	20.00	200	0.00	20.00
5	Bonifacio Herrera/ Barangay Lourdes, Panglao	29.00	Deep Well	22.90	150	0.00	22.90
6	CDF/ Barangay Libaong, Panglao	30.00	Shallow Well	18.00	100	0.00	18.00
7	DPWH/ Barangay Libaong, Panglao	30.00	Deep Well	21.00	100	0.00	21.00
8	DPWH/ Barangay Bolod, Panglao	26.00	Deep Well	39.00	100	28.60	10.40
9	DPWH/ Barangay Libaong, Panglao	30.00	Deep Well	21.00	100	0.00	21.00
10	DPWH/ Barangay Libaong, Panglao	28.00	Deep Well	21.00	100	0.00	21.00
11	DPWH/ Barangay Libaong, Panglao	20.00	Deep Well	21.00	100	0.00	21.00
12	DPWH/ Barangay Libaong, Panglao	23.00	Deep Well	21.00	100	0.00	21.00
13	DPWH/ Barangay Libaong, Panglao	22.00	Deep Well	21.00	100	0.00	21.00
14	DPWH/ Barangay Libaong, Panglao	22.00	Deep Well	24.00	100	0.00	24.00

TABLE 2A

WELL DATA SUMMARY

Well No.	Location Owner/Barangay	Ground Elevation (m)	Well Type	Depth (m)	Casing Size (mm)	SWL (m bgl)	Water Column (m)
15	Barangay/ Barangay Bolod, Panglao	25.00	Deep Well	24.00		15.00	9.00
16	Barangay/ Barangay Bolod, Panglao	17.00	Open Dug Well	24.00	1200	9.00	15.00
17	Sofronio Dulanas/ Barangay Dao, Dauis	30.00	Open Dug Well	27.00	1500	10.00	17.00
18	Barangay/ Barangay Dao, Dauis	24.00	Deep Well	24.00	100	18.00	6.00
19	DPWH/ Barangay Tinago, Dauis	25.00	Deep Well	29.00	100	20.70	8.30
20	Barangay/ Barangay Tinago, Duis	25.00	Open Dug Well	25.00	1200	20.70	8.30
21	DPWH/ Barangay Tinago, Dauis	30.00	Deep Well	30.00	100	21.70	8.30
22	Gregorio Guirigay/ Barangay Tinago, Dauis	30.00	Open Dug Well	29.00	1200	5.00	24.00
23	DPWH/ Barangay Tinago, Dauis	30.00	Deep Well	34.00	100	15.00	19.00
24	Monastery/ Barangay Tabalong, Dauis	30.00	Deep Well	28.00	100	17.20	10.80
25	DPWH/ Barangay Tinago, Dauis	40.00	Deep Well	30.00	100	21.70	8.30
26	DPWH/ Barangay Tinago, Dauis	60.00	Deep Well	29.00	100	20.70	8.30
27	Barangay/ Barangay Biking, Dauis	15.00	Deep Well	14.00	100	2.80	11.20
28	Barangay/ Barangay Biking, Dauis	70.00	Deep Well	95.00	200	82.00	13.00

TABLE 2A

WELL DATA SUMMARY

Well No.	Location Owner/Barangay	Ground Elevation (m)	Well Type	Depth (m)	Casing Size (mm)	SWL (m bgl)	Water Column (m)
29	Vidal Poculan/ Barangay Tangnan, Panglao	10.00	Open Dug Well	19.00	1200	18.00	1.00
30	Amancio Clenista/ Barangay Tangnan, Panglao	7.00	Open Dug Well	13.00	1200	12.00	1.00
31	Bartolome Luspo/ Barangay Danao, Panglao	8.00	Open Dug Well	8.00	1200	7.00	1.00
32	Epifanio Bongay/ Barangay Danao, Panglao	10.00	Open Dug Well	6.00	1200	5.00	1.00
33	Lamberto Cubeta/ Barangay Tawala, Panglao	13.00	Open Dug Well	11.90	1200	10.90	1.00
34	Anastacio Monton/ Barangay Tawala, Panglao	30.00	Open Dug Well	13.50	1200	12.50	1.00
35	Modesto Alasagas/ Barangay Tawala, Panglao	15.00	Open Dug Well	12.40	1200	11.40	1.00
36	Liborio Fuentes/ Barangay Tawala, Panglao	16.00	Open Dug Well	12.50	1200	11.50	1.00
37	Ciriaco Guigi/ Barangay Tawala, Panglao	27.00	Open Dug Well	19.40	1200	18.40	1.00
38	Marcella Milagros/ Barangay Tawala, Panglao	28.00	Shallow Well	18.50	100	17.00	1.50
39	Sofia Mijo/ Barangay Tawala, Panglao	30.00	Open Dug Well	19.00	1200	18.00	1.00
40	Barangay/ Barangay Tawala, Panglao	14.00	Open Dug Well	16.00	1200	15.00	1.00

Dyuk

6 pcs = 6 — 19.6

TABLE 28

WELL DATA SUMMARY

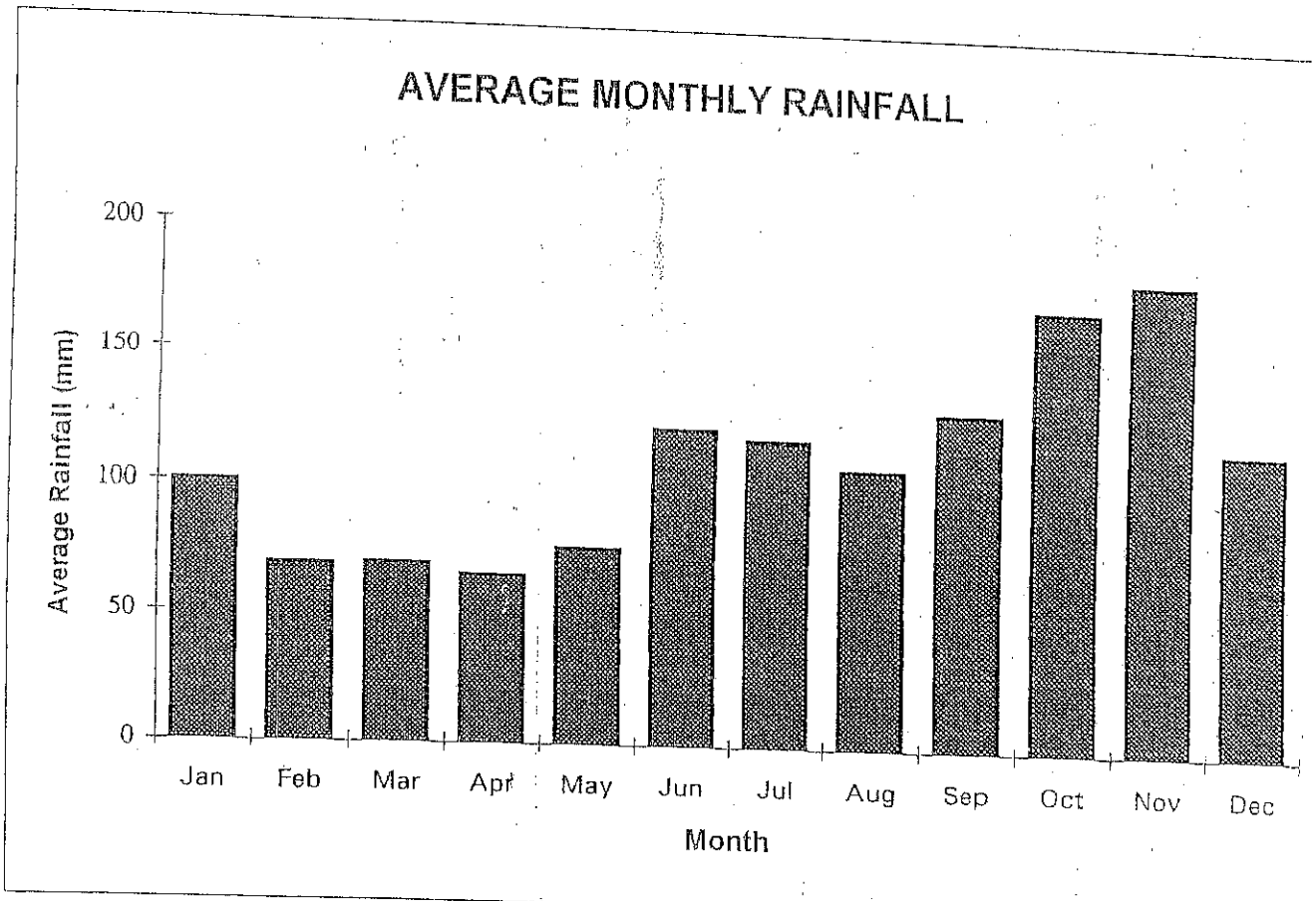
Well No.	Location Barangay	Year Constructed	Ground Elev.(m)	Depth (m)	Casing Size (mm)	SWL (m bgl)	PWL (m bgl)	Discharge Cap. (Lps)	Specific Cap.(lps/m)	Chloride (mg/L)
1	PPUD System Well No. 4/ Barangay Dampas, Tagbilaran	1956	45.00	59.50	150	41.20	43.60	11.37	4.74	850.00
2	PPUD System Well No. 5/ Barangay Dampas, Tagbilaran	1986	41.90	61.60	200	39.63	43.90	11.12	1.05	106.00
3	PPUD System Well No. 7/ Barangay Dao, Tagbilaran	1971	45.00	64.00	300	33.54	39.60	9.98	1.65	18.00
4	PPUD System Well No. 9/ Barangay Cogon, Tagbilaran	1981	36.00	53.40	200	35.98	38.42	12.22	5.00	272.00
5	PPUD System Well No. 10/ Barangay Dampas, Tagbilaran	1982	45.90	67.10	200	45.43	48.48	6.34	2.08	16.00
6	PPUD Well No. 11/ Barangay Dampas, Tagbilaran	1986	45.00	59.50	200	39.60	44.78	13.93	2.69	20.00
7	PPUD System Well No. 12/ Barangay Mansasa, Tagbilaran	1989	45.00	59.50	200	39.63	44.81	9.09	1.76	390.00
8	PPUD System Well No. 14/ Barangay Dampas, Tagbilaran	1989	38.90	60.10	200	40.24	45.42	3.69	0.71	60.00
9	PPUD System Well No. 15/ Barangay Dao, Tagbilaran	1990	45.80	61.60	200	41.16	45.73	3.73	0.82	18.00
10	Lindaville/ Barangay Dao, Tagbilaran	1975	45.00	59.50	150	41.16	46.65	10.34	1.88	22.00
11	TCWS System Well No. 1/ Barangay Tiptip, Tagbilaran	1960	35.00	48.80	100	39.63		1.99		15.00
12	TCWS System Well No. 2/ Barangay Tiptip, Tagbilaran	1988	35.00	50.30	200	39.63		2.85		35.00
13	TCWS System Well No. 3/ Barangay Dao, Tagbilaran	1990	45.00	70.10	200	38.11				102.00
14	TCWS System Well No. 4/ Barangay Dao, Tagbilaran	1991	40.00	70.10	200	35.06				

TABLE 3

DEDUCED RESISTIVITY VALUES

VES No.	Elevation (m)	ρ_1 (ohm-m)	h_1 (m)	ρ_2 (ohm-m)	h_2 (m)	ρ_3 (ohm-m)	h_3 (m)	ρ_4 (ohm-m)	h_4 (m)	ρ_5 (ohm-m)
1	14	34.0	1.2	238.0	12.0	30.0	69.0	< (1)		
2	15	460.0	1.0	230.0	5.2	1,750.0	14.9	75.0	89.9	< (1)
3	14	150.0	1.2	300.0	6.0	31.4	42.4	< (1)		
4	15	60.0	1.2	1,200.0	6.0	85.0	57.0	< (1)		
5	25	205.0	1.3	307.0	7.0	750.0	40.8	6.8		
6	25	150.0	1.1	1,050.0	6.4	533.0	40.0	5.5		

FIGURES



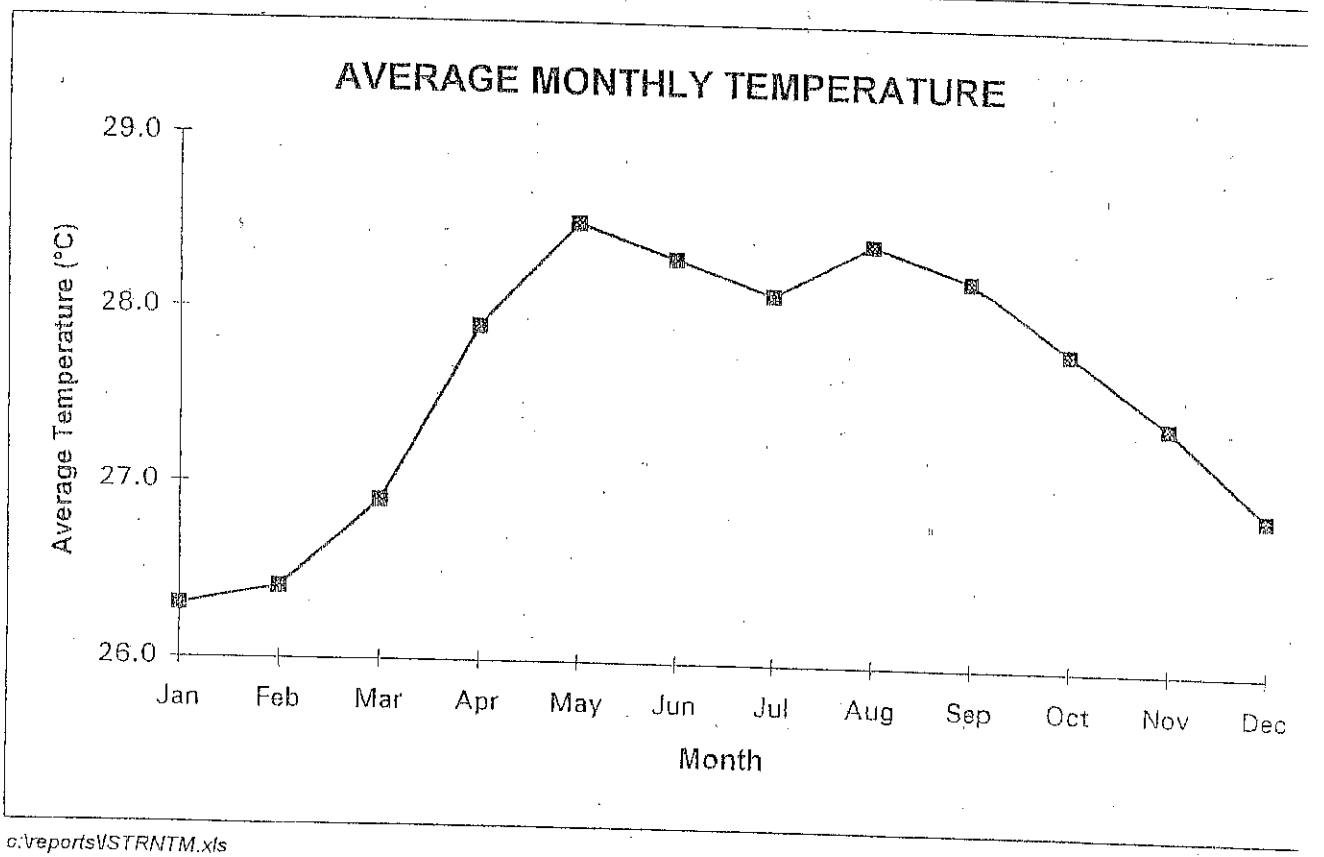


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FIGURE 2

AVERAGE MONTHLY RAINFALL
and TEMPERATURE GRAPHS

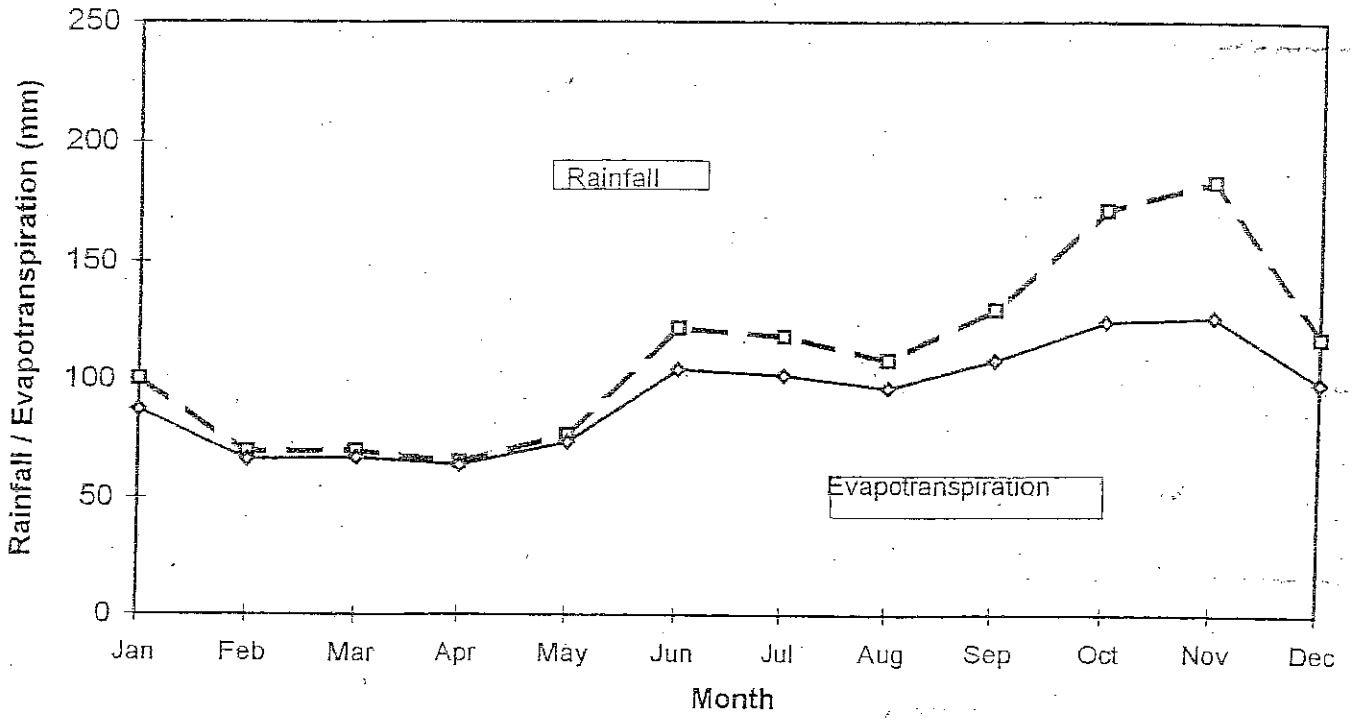
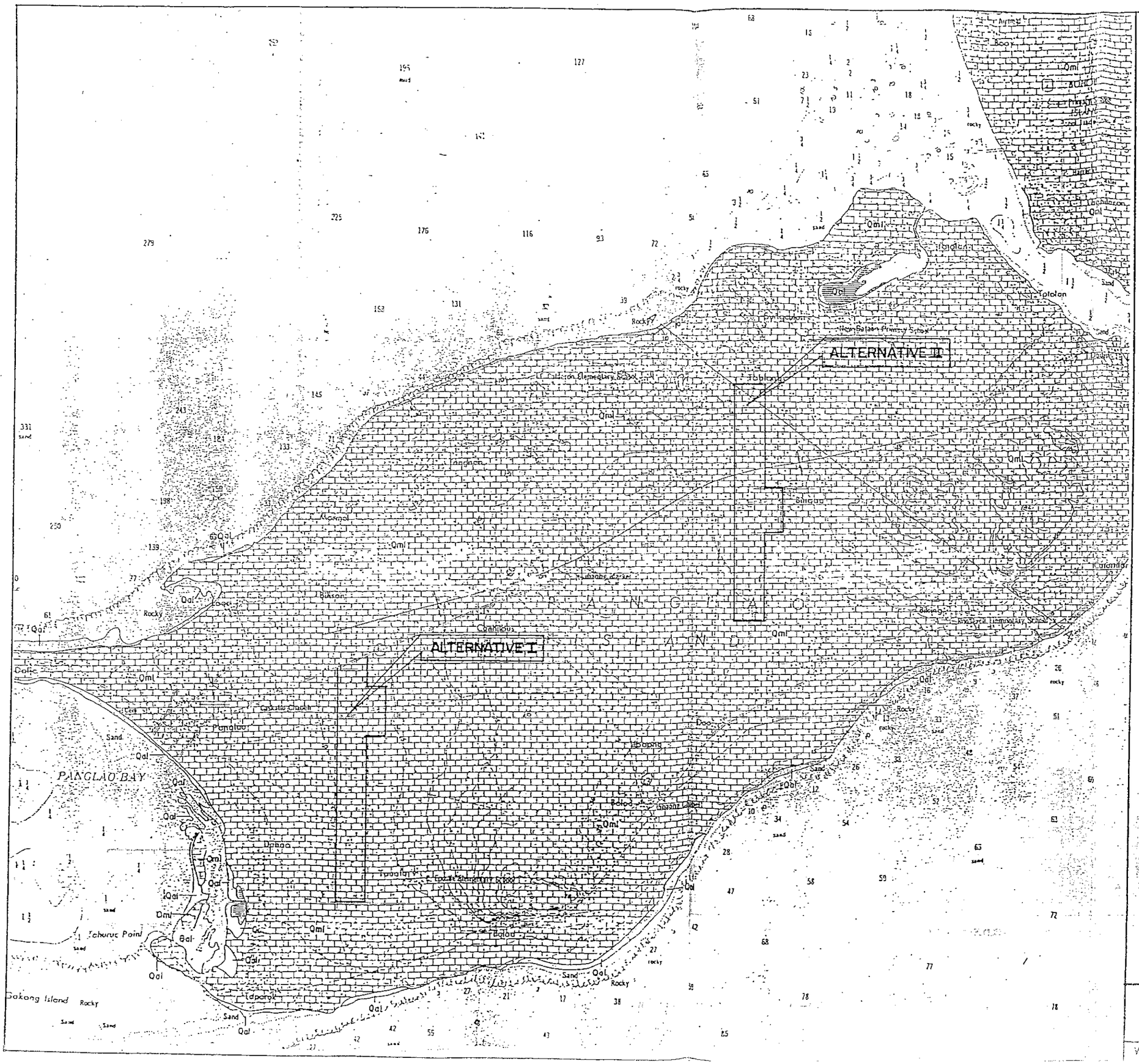


FIGURE 3
AVERAGE MONTHLY RAINFALL
& EVAPOTRANSPIRATION GRAPHS



LEGEND :

- Qal — Quaternary Alluvium
- Qml — Maribojoc Limestone
- Study Area

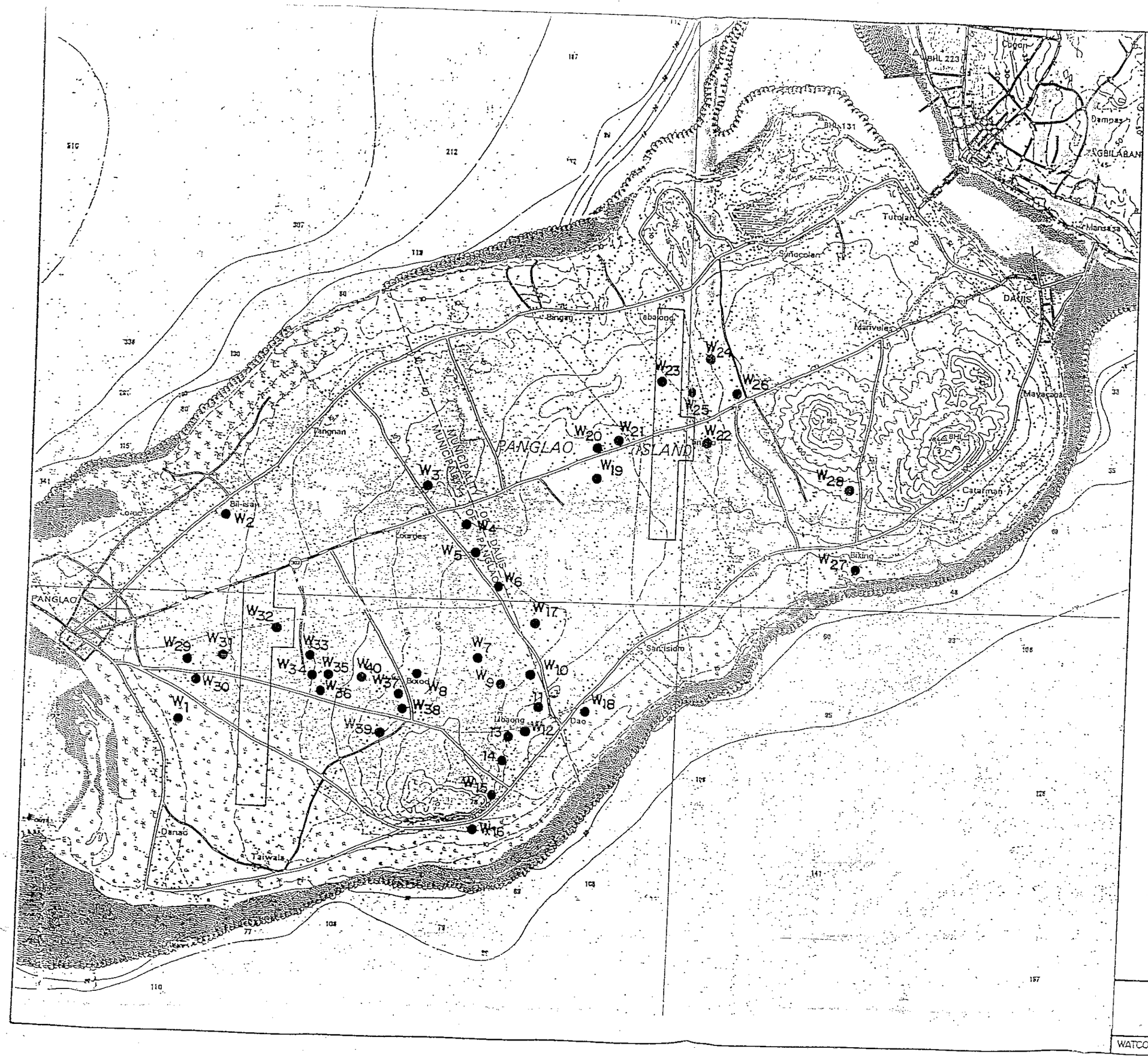
0 1,000 2,000 3,000

SCALE : 1 : 50,000 METERS

GEOLOGIC MAP

FIGURE 4

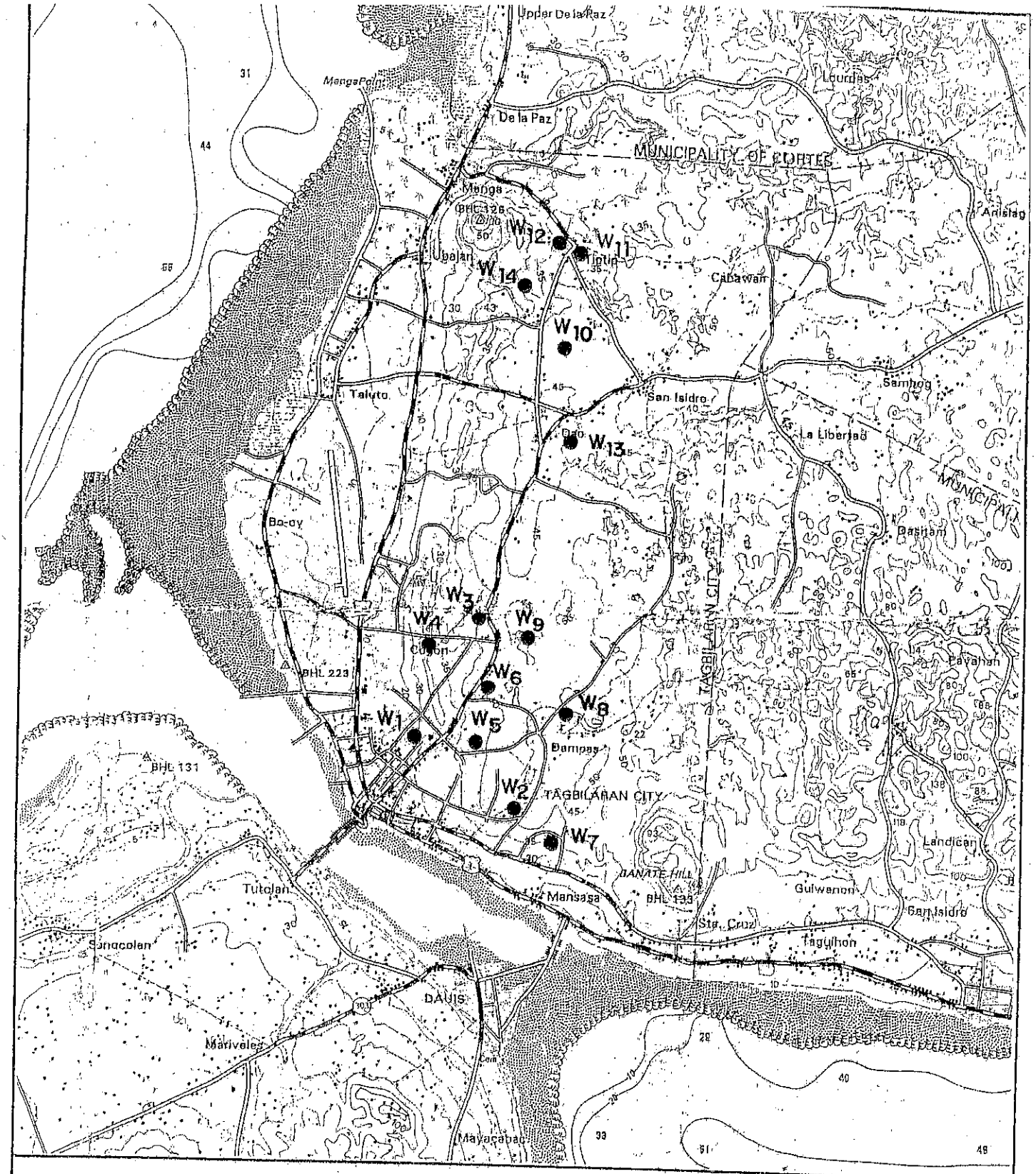
WATCON, INC.

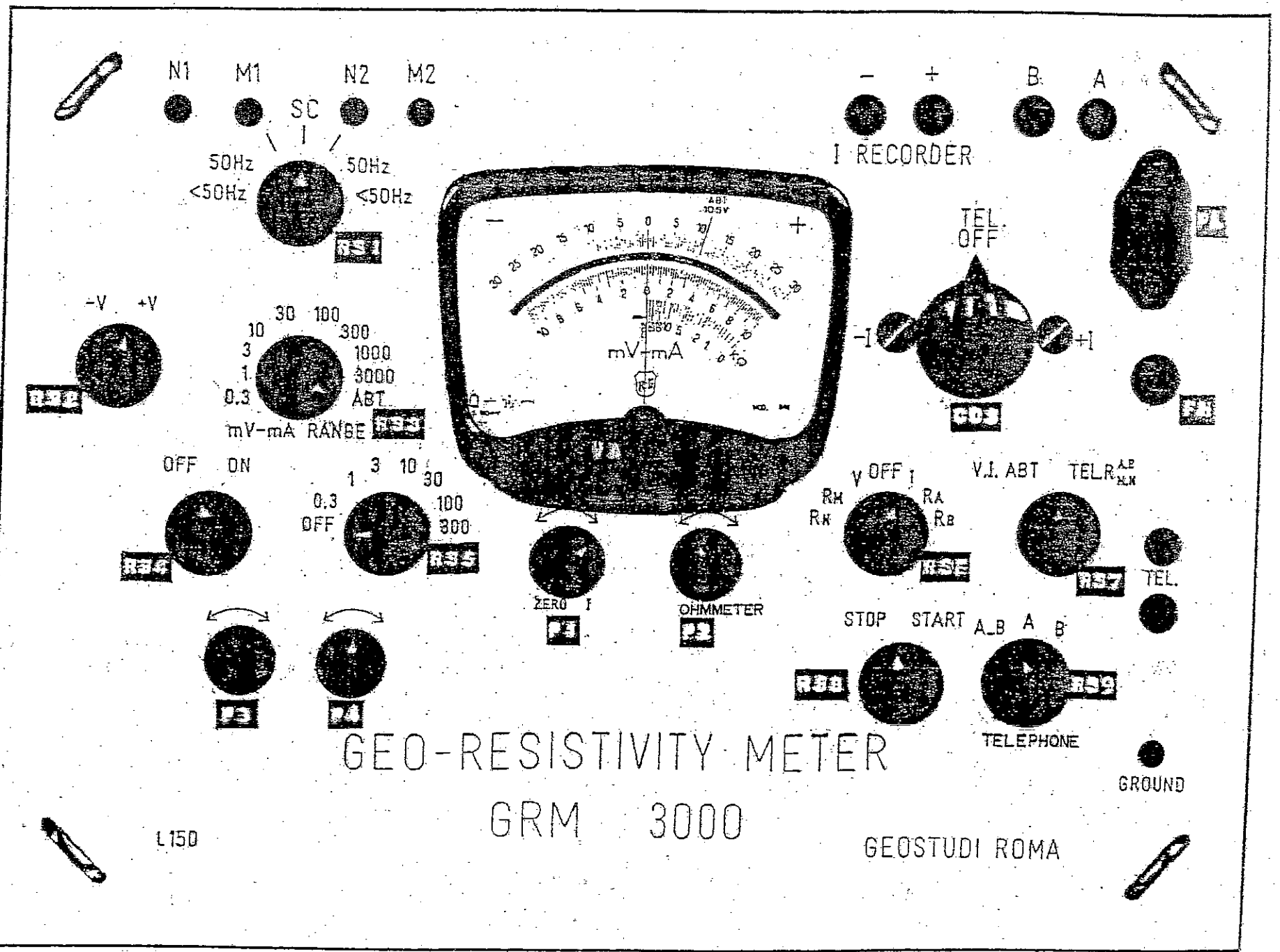


WELL LOCATION MAP

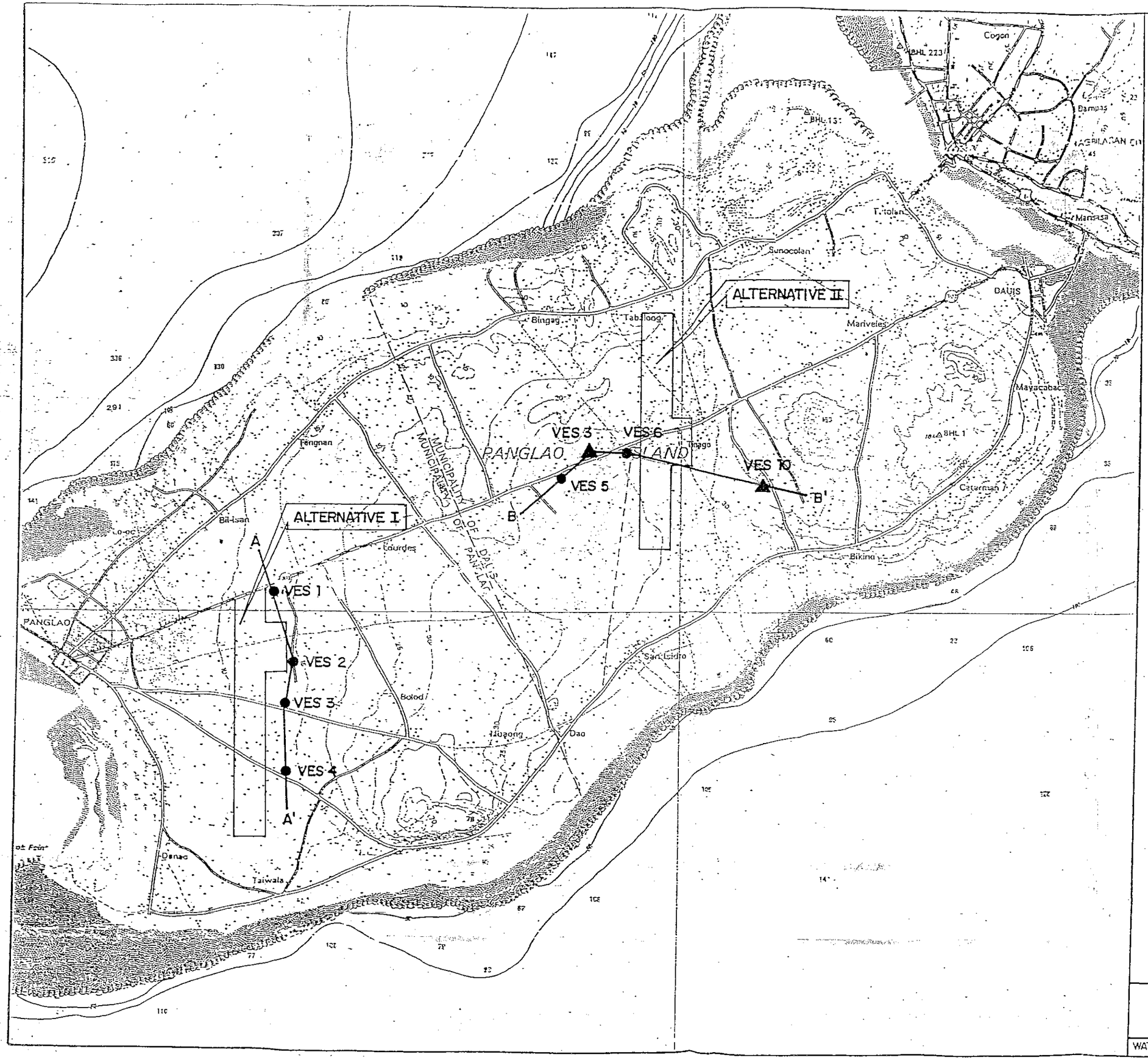
FIGURE 5a

WATCON, INC.


Upper De la Paz
Mangapan
De la Paz
Lourdes
MUNICIPALITY OF CORTES
Anislag
Mahaba
BHL 126
Ubalan
Iglip
Cabawan
Taluto
San Isidro
Samhog
La Libertad
Bo-oy
Basilan
Cubon
BHL 223
Bohol Strait
Bohol Strait
Bohol Strait



WATCON, INC.	GRM-3000 CONTROL PANEL	FIGURE 6



LEGEND :

VES 1 — Vertical Electrical Sounding (VES) Point and Number, 2000

A — VES 1 — VES 2 — VES 3 — VES 4 — A' — Electrostratigraphic Section

VES 1 — Vertical Electrical Sounding (VES) Point and Number, 1996

Study Area

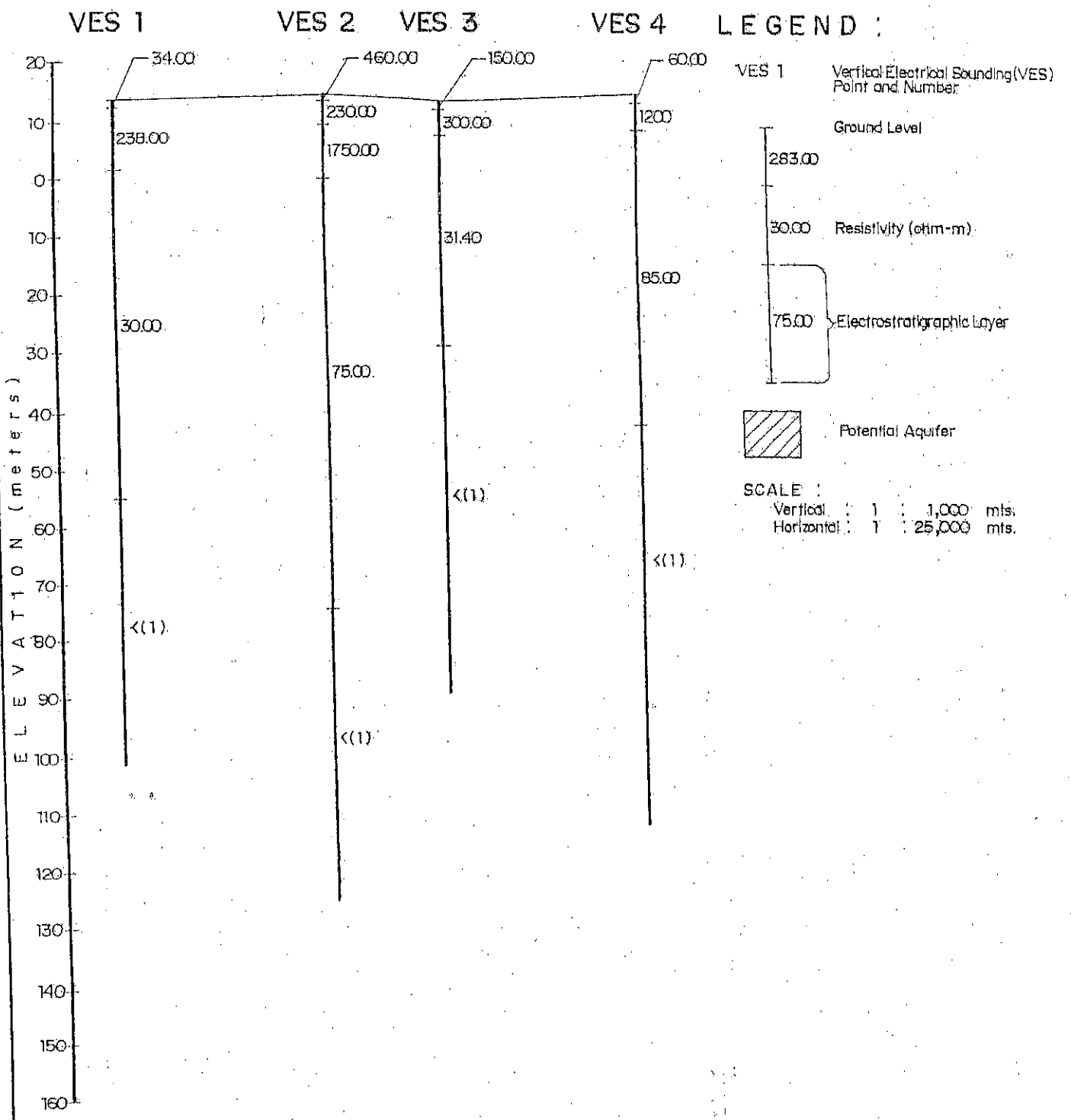
0 1,000 2,000 3,000

SCALE: 1 : 50,000 METERS

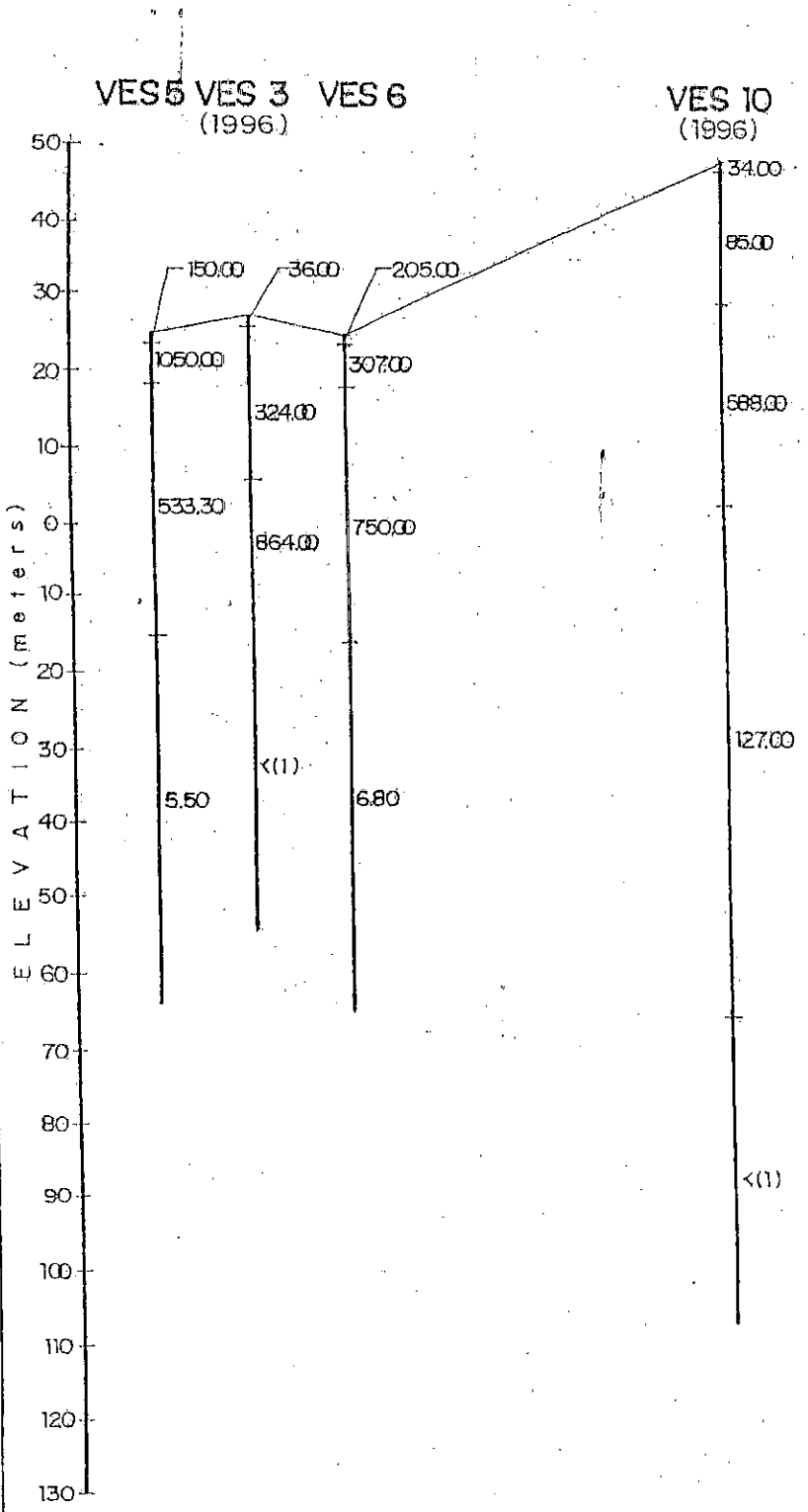
VES LOCATION MAP

FIGURE 7

WATCON, INC.



ELECTROSTRATIGRAPHIC SECTION	FIGURE 8
WATCON, INC.	SECTION A-A'



LEGEND :

VES 1 — Vertical Electrical Sounding (VES) Point and Number

Ground Level

150.00

1050.00 — Resistivity (ohm-m)

533.30 — Electrostratigraphic Layer

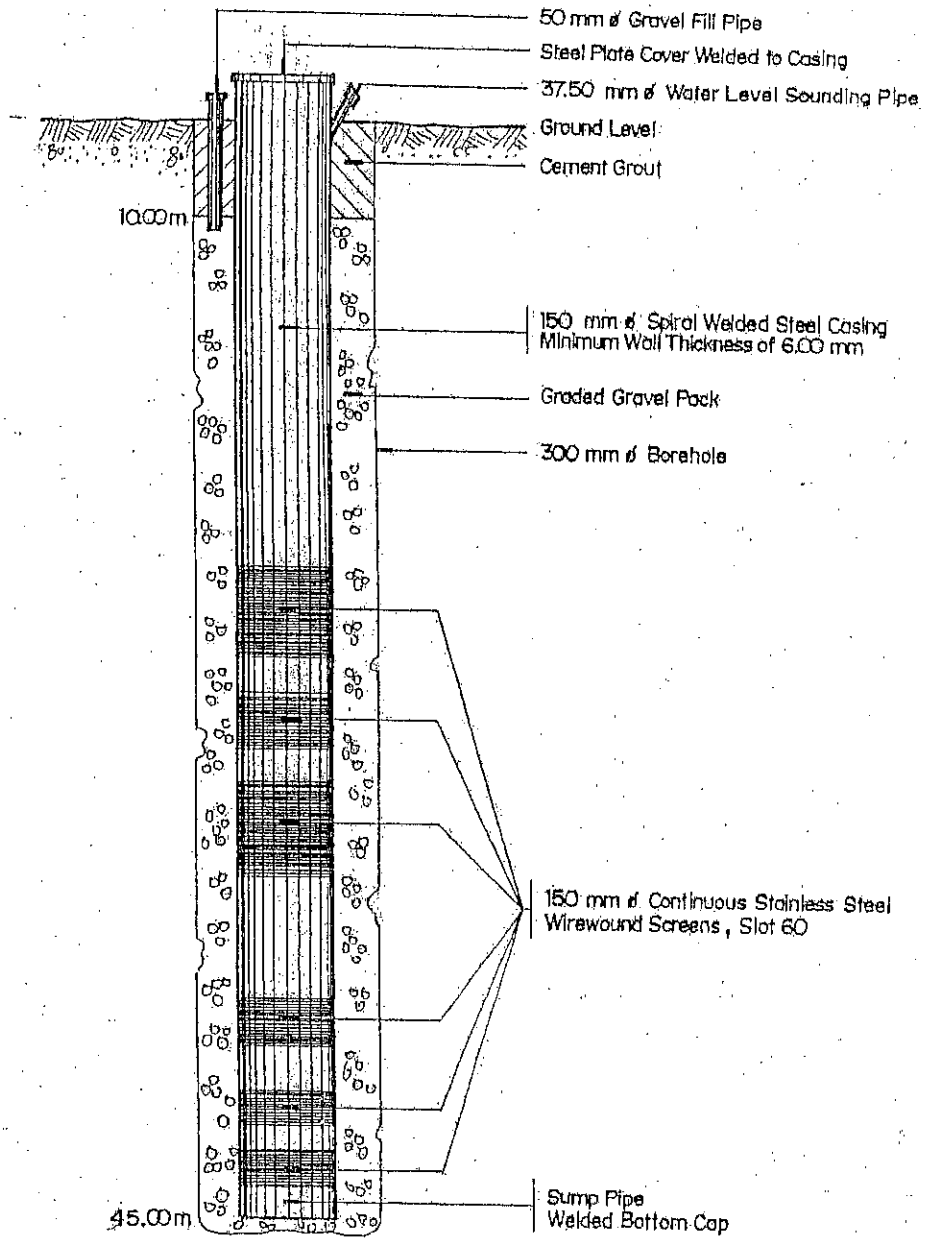
Potential Aquifer

SCALE :

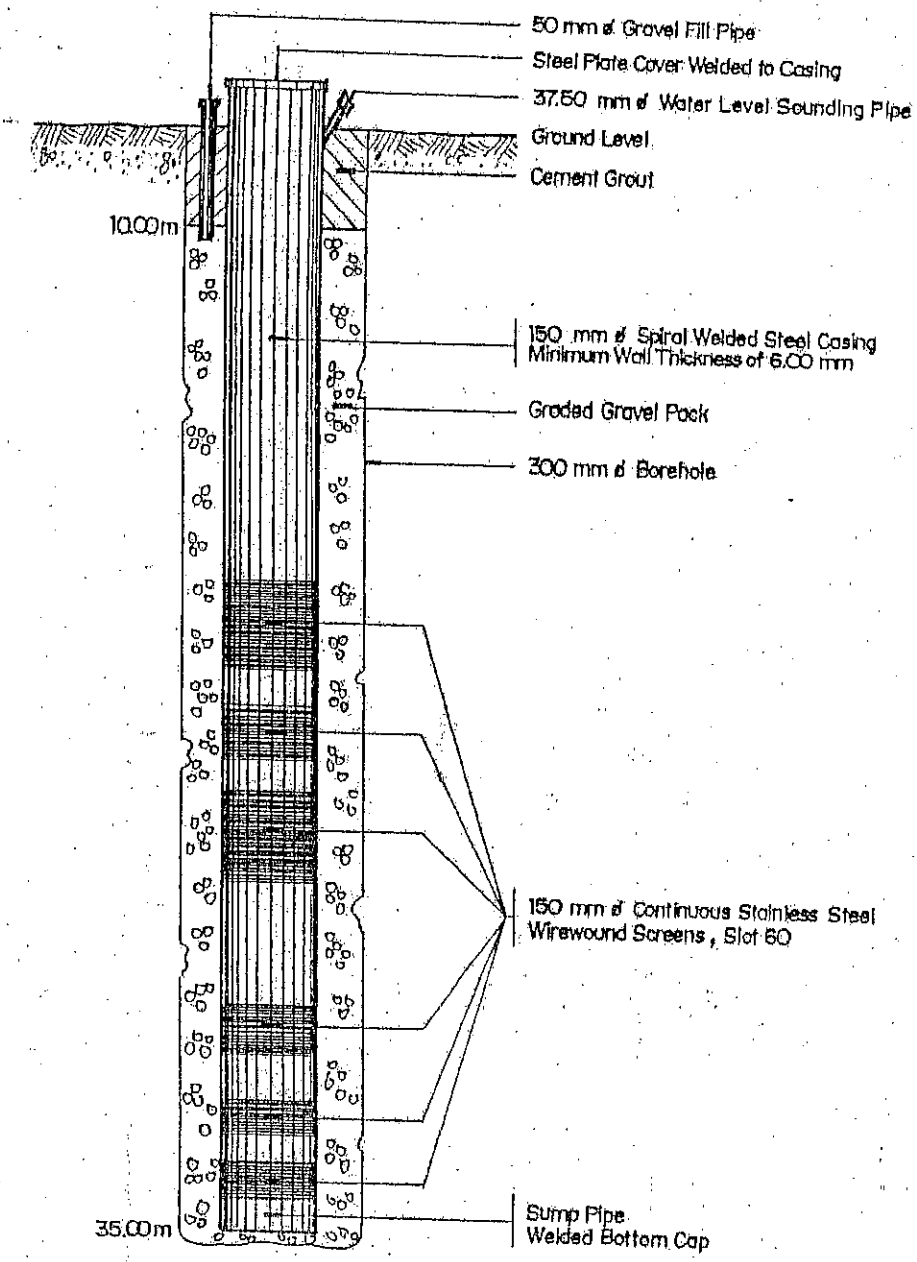
Vertical : 1 : 1,000 mts.

Horizontal : 1 : 40,000 mts.

ELECTROSTRATIGRAPHIC SECTION	FIGURE 9
WATCON, INC	SECTION B - B'

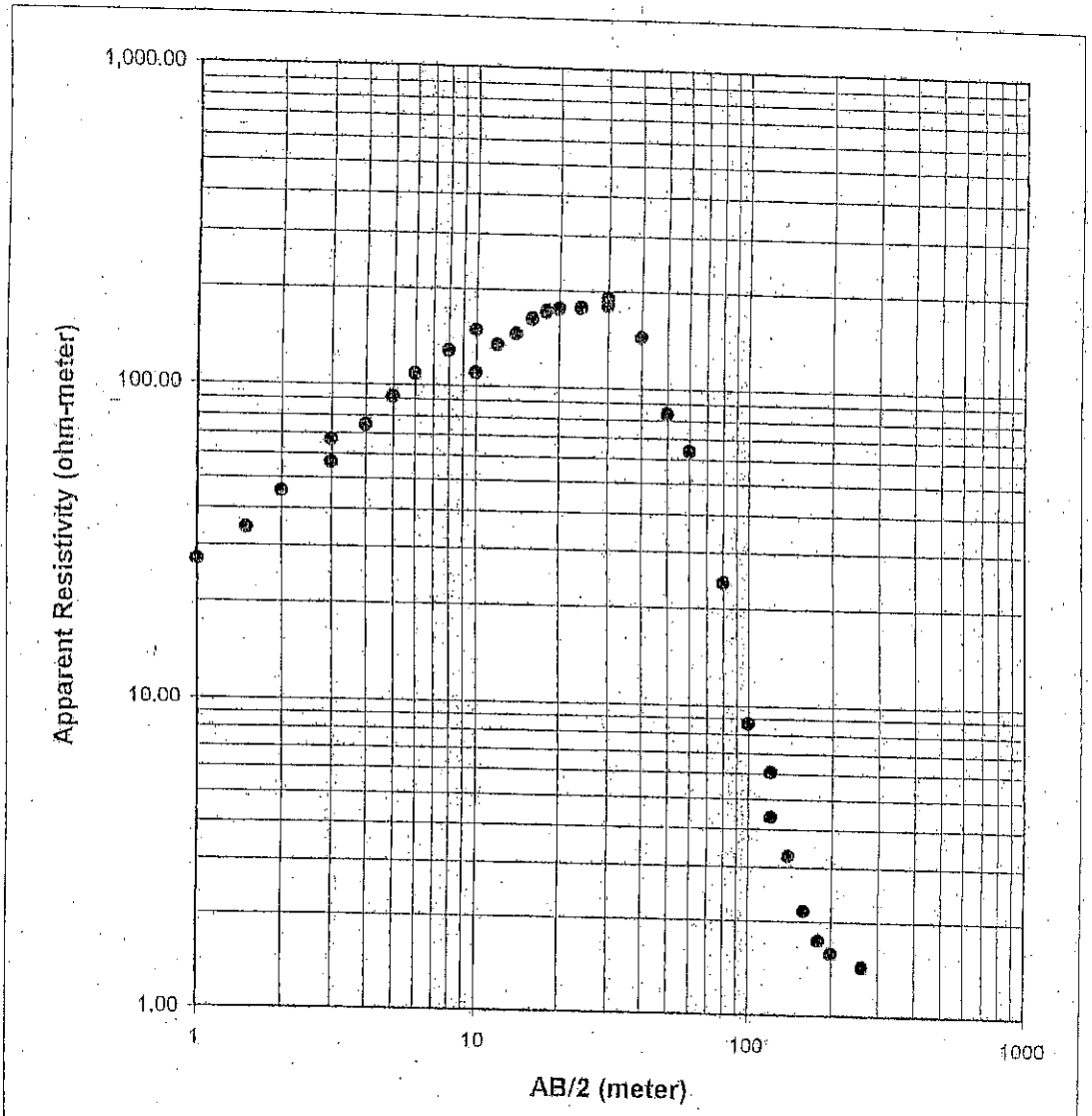


PRELIMINARY WELL DESIGN ALTERNATIVE I	FIGURE 11a
WATCON, INC.	



PRELIMINARY WELL DESIGN ALTERNATIVE II	FIGURE 11b
WATCON, INC.	

APPENDICES



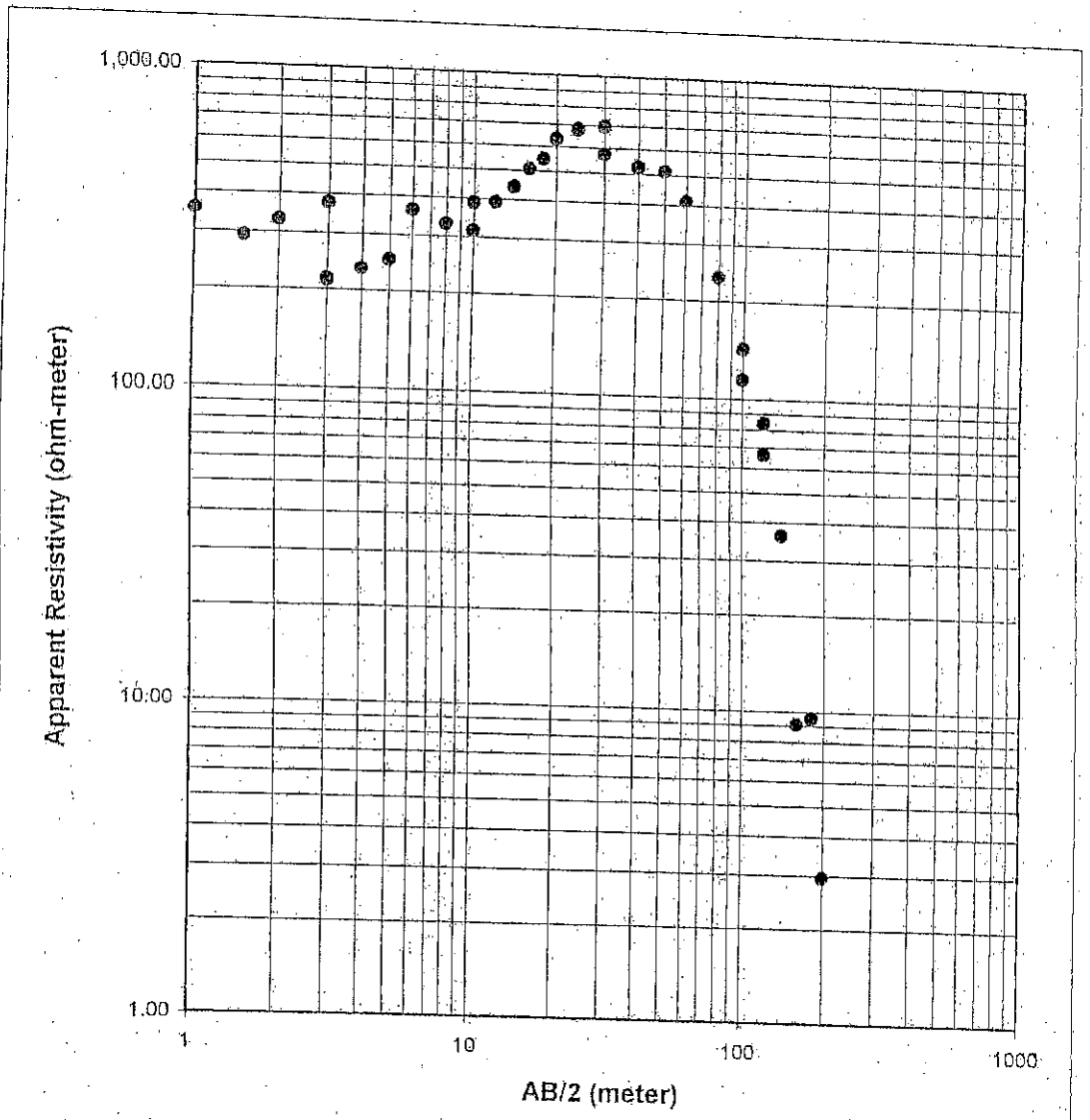
VES No.	1	Array	Schlumberger
Project	Panglao Airport	Elevation	14 mamsl
Location	Barangay Tawala, Panglao	Latitude	9° 35' 21 N
Date	May 25, 2000	Longitude	123° 46' 19 E

FIELD DATA

AB/2	Resistivity	AB/2	Resistivity	AB/2	Resistivity	AB/2	Resistivity
1	26.97	10	109.39	40	144.45	180	1.74
1.5	34.25	12	134.09	50	83.50	200	1.58
2	45.17	14	145.96	60	63.78	260	1.43
3	66.42	16	163.05	80	24.01	300	0.78
3	56.32	18	171.75	100	8.67	350	
4	74.47	20	175.24	120	4.36	400	
5	91.43	24	177.12	100		500	
6	108.29	30	190.37	120	6.04		
8	128.00	40		140	3.27		
10	149.28	30	179.69	160	2.17		

INTERPRETED DATA

Resistivity (ohm-m)		Depth (m)		Resistivity		Depth (m)	
ρ_1	34.0	d_1	1.2	ρ_5		d_5	
ρ_2	238.0	d_2	12.0	ρ_6		d_6	
ρ_3	30.0	d_3	69.0	ρ_7		d_7	
ρ_4	< (1)	d_4		ρ_8		d_8	



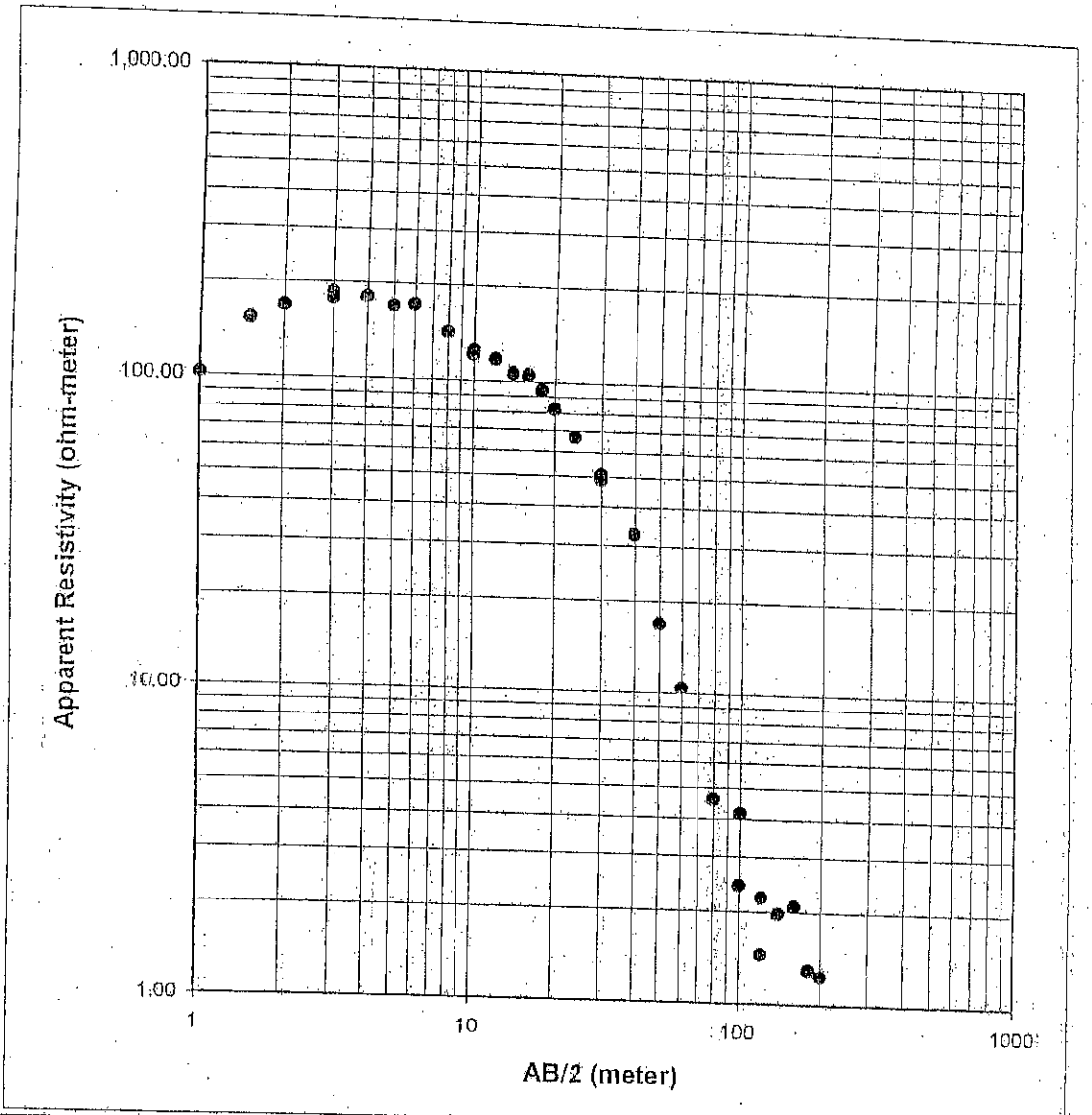
VES No.	2	Array	Schlumberger
Project	Panglao Airport	Elevation	15 mamsl
Location	Barangay Tawala, Panglao	Latitude	9^0 34' 44 N
Date	May 25, 2000	Longitude	123^0 46' 24 E

FIELD DATA

AB/2	Resistivity	AB/2	Resistivity	AB/2	Resistivity	AB/2	Resistivity
1	354.00	10	315.10	40	524.50	180	9.51
1.5	292.27	12	392.40	50	511.80	200	2.95
2	329.33	14	439.90	60	412.30	260	
3	374.70	16	502.90	80	236.60	300	
3	214.90	18	544.40	100	114.20	350	
4	232.30	20	633.30	120	66.10	400	
5	249.40	24	678.30	100		500	
6	361.50	30	693.70	120	84.08		
8	329.40	40		140	36.20		
10	387.50	30	571.70	160	9.05		

INTERPRETED DATA

Resistivity (ohm-m)		Depth (m)		Resistivity		Depth (m)	
ρ_1	460.0	d_1	1.0	ρ_5	< (1)	d_5	
ρ_2	230.0	d_2	5.2	ρ_6		d_6	
ρ_3	1750.0	d_3	14.9	ρ_7		d_7	
ρ_4	75.0	d_4	89.9	ρ_8		d_8	



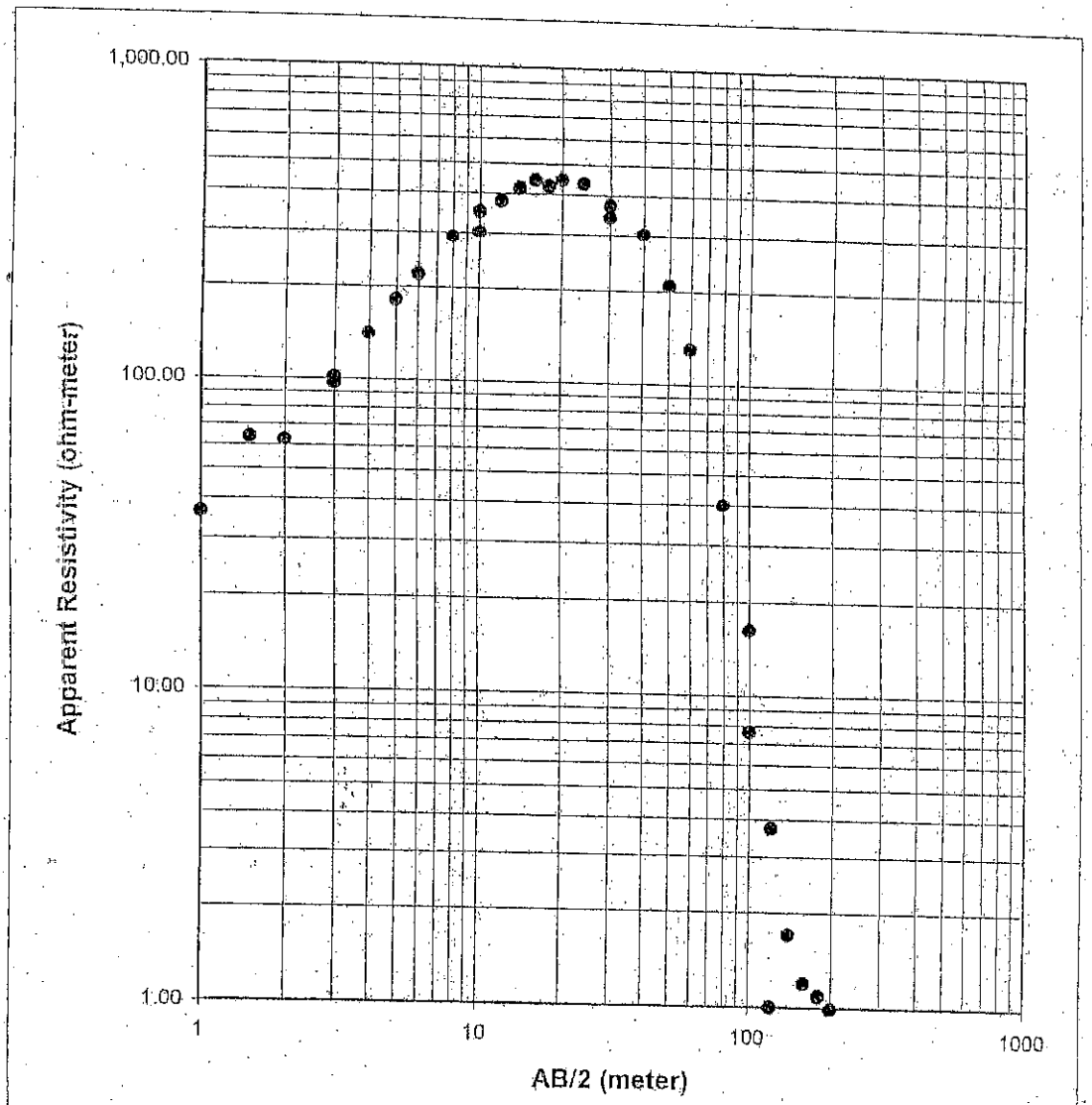
VES No.	3	Array	Schlumberger
Project	Panglao Airport	Elevation	14 mamsl
Location	Barangay Tawala, Panglao	Latitude	9° 34' 22 N
Date	May 25, 2000	Longitude	123° 46' 25 E

FIELD DATA

AB/2	Resistivity	AB/2	Resistivity	AB/2	Resistivity	AB/2	Resistivity
1	101.14	10	122.92	40	32.67	180	1.30
1.5	151.68	12	116.41	50	16.86	200	1.24
2	167.20	14	105.42	60	10.46	260	
3	185.70	16	104.60	80	4.58	300	
3	177.00	18	93.81	100	2.44	350	
4	180.34	20	81.75	120	1.45	400	
5	169.35	24	66.61	100		500	
6	171.23	30	48.62	120	2.23		
8	141.08	40		140	1.98		
10	119.55	30	50.87	160	2.09		

INTERPRETED DATA

Resistivity (ohm-m)		Depth (m)		Resistivity		Depth (m)	
ρ_1	150.0	d_1	1.2	ρ_5		d_5	
ρ_2	300.0	d_2	6.0	ρ_6		d_6	
ρ_3	31.4	d_3	42.4	ρ_7		d_7	
ρ_4	< (1)	d_4		ρ_8		d_8	



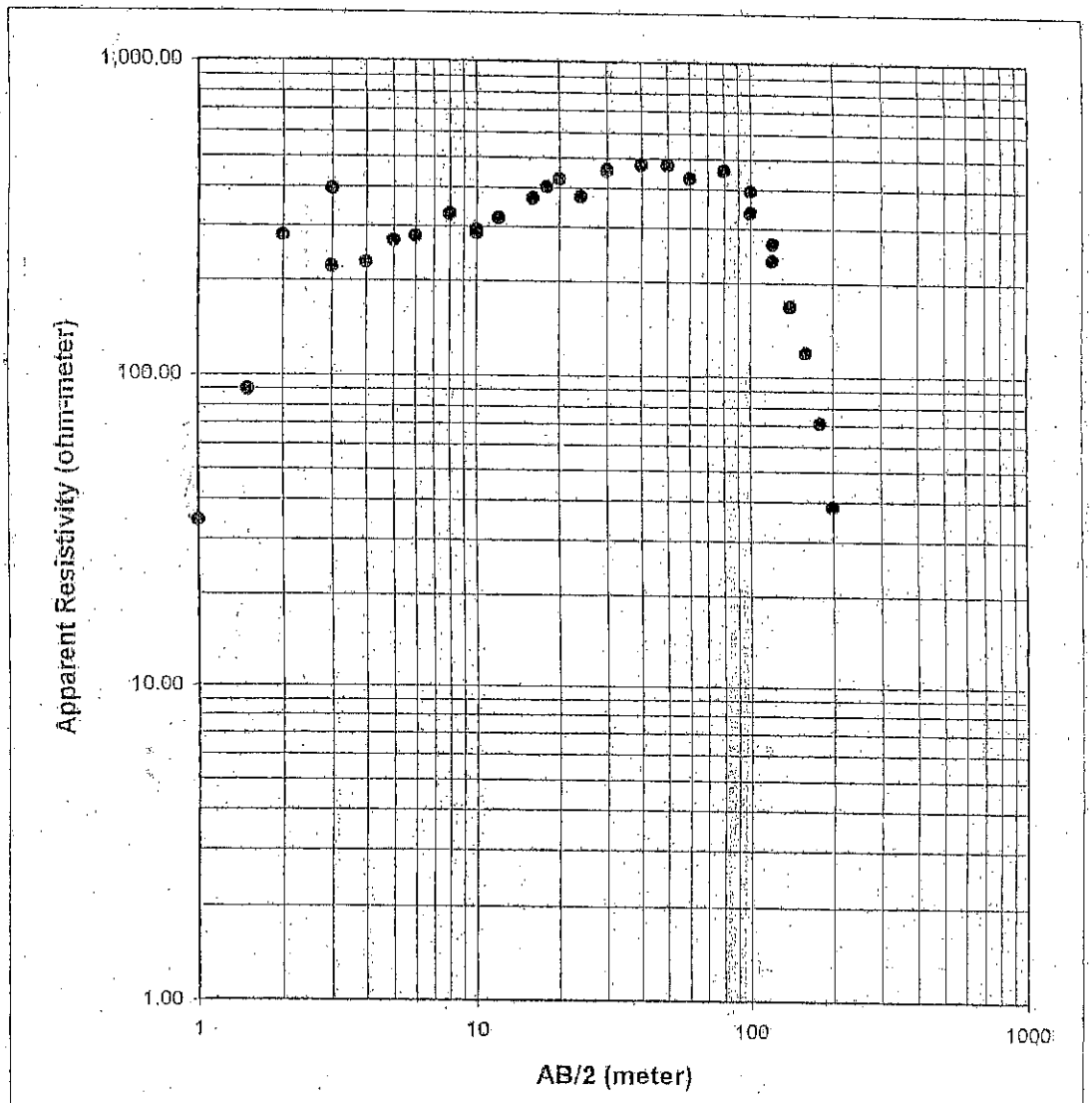
VES No.	4	Array	Schlumberger
Project	Panglao Airport	Elevation	14 mamsl
Location	Barangay Tawala, Panglao	Latitude	9° 33' 51 N
Date	May 25, 2000	Longitude	123° 46' 24 E

FIELD DATA

AB/2	Resistivity	AB/2	Resistivity	AB/2	Resistivity	AB/2	Resistivity
1	36.20	10	301.35	40	302.44	180	1.09
1.5	63.93	12	378.88	50	208.99	200	0.99
2	62.29	14	415.50	60	129.45	260	
3	96.34	16	443.01	80	39.86	300	
3	101.14	18	424.15	100	7.64	350	
4	140.43	20	444.20	120	1.00	400	
5	181.81	24	433.37	100		500	
6	219.23	30	371.35	120	3.75		
8	289.95	40		140	1.70		
10	349.35	30	342.00	160	1.19		

INTERPRETED DATA

Resistivity (ohm-m)		Depth (m)		Resistivity		Depth (m)	
ρ_1	60.0	d_1	1.2	ρ_5		d_5	
ρ_2	1200.0	d_2	6.0	ρ_6		d_6	
ρ_3	85.0	d_3	57.0	ρ_7		d_7	
ρ_4	< (1)	d_4		ρ_8		d_8	



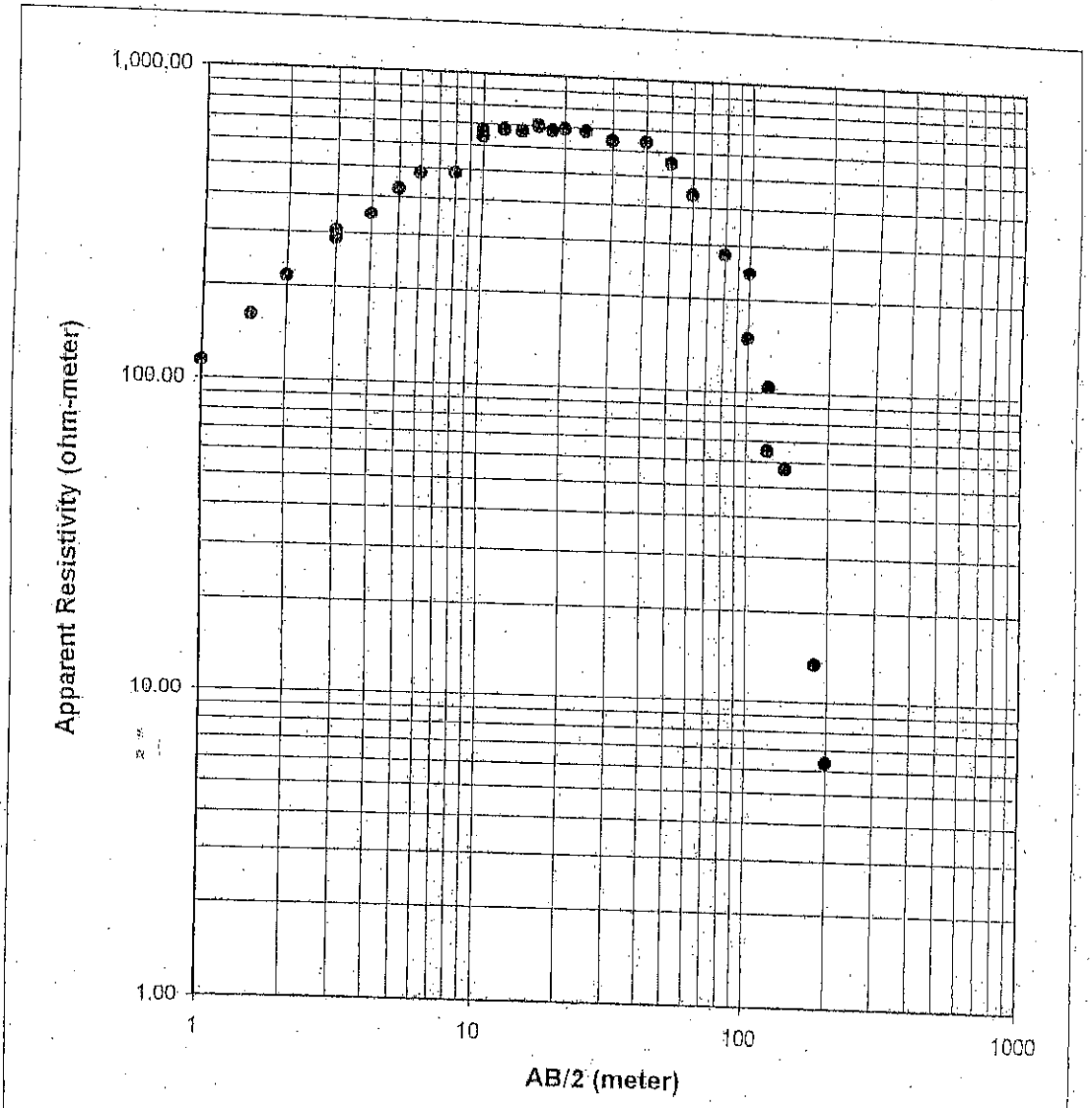
VES No.	5	Array	Schlumberger
Project	Panglao Airport	Elevation	25 mamsl
Location	Barangay Tinago, Dauis	Latitude	9^0 33' 18 N
Date	May 25, 2000	Longitude	123^0 48' 49 E

FIELD DATA

AB/2	Resistivity	AB/2	Resistivity	AB/2	Resistivity	AB/2	Resistivity
1	34.33	10	283.79	40	475.44	180	71.03
1.5	89.58	12	320.74	50	475.24	200	38.31
2	279.22	14	0.00	60	434.12	260	
3	393.40	16	369.84	80	458.14	300	
3	221.25	18	403.54	100	337.52	350	
4	229.23	20	427.33	120	236.04	400	
5	268.80	24	375.05	100		500	
6	277.00	30	454.90	120	265.63		
8	329.96	40		140	167.65		
10	293.51	30	459.40	160	119.04		

INTERPRETED DATA

Resistivity (ohm-m)		Depth (m)		Resistivity		Depth (m)	
ρ_1	205.0	d_1	1.3	ρ_5		d_5	
ρ_2	307.5	d_2	7.0	ρ_6		d_6	
ρ_3	750.0	d_3	40.8	ρ_7		d_7	
ρ_4	6.8	d_4		ρ_8		d_8	



VES No.	6	Array	Schlumberger
Project	Panglao Airport	Elevation	25 mamsl
Location	Barangay Tinago, Dauis	Latitude	9° 36' 06 N
Date	May 25, 2000	Longitude	123° 48' 21 E

FIELD DATA

AB/2	Resistivity	AB/2	Resistivity	AB/2	Resistivity	AB/2	Resistivity
1	113.46	10	640.22	40	639.08	180	13.46
1.5	159.83	12	677.14	50	549.71	200	6.34
2	214.89	14	668.49	60	438.57	260	
3	305.09	16	698.92	80	278.57	300	
3	286.57	18	679.19	100	148.76	350	
4	349.92	20	690.16	120	64.89	400	
5	426.70	24	682.78	100		500	
6	478.18	30	638.18	120	103.86		
8	483.27	40		140	56.94		
10	668.30	30	642.55	160			

INTERPRETED DATA

Resistivity (ohm-m)		Depth (m)		Resistivity		Depth (m)	
ρ_1	150.0	d_1	1.1	ρ_5		d_5	
ρ_2	1050.0	d_2	6.4	ρ_6		d_6	
ρ_3	533.3	d_3	40.0	ρ_7		d_7	
ρ_4	5.5	d_4		ρ_8		d_8	

APPENDIX XIII

PERCEPTION SURVEY RESULTS

PERCEPTIONS ON THE CENTRAL VISAYAS AIRPORT PROJECT SOCIAL ACCEPTABILITY: BOHOL PROVINCE

Introduction

One alternative step of province to leapfrog to socio-economic progress is the development of airports. Aware of this contribution to progress, the Central Visayas Airports Feasibility Study Project therefore contracted the services of TCGI Engineers, a local engineering consultancy firm, to determine the feasibility of an airport to serve Bohol in particular and Central Visayas in general. The first alternative being considered is the upgrading of existing Tagbilaran Airport. Other alternative sites seriously considered are the municipalities of Panglao and Dauis.

As required in any government project a pre-development study is to be undertaken in its macro perspective. This paper aims to contribute to the environmental assessment particularly on the social acceptability of the airport project as perceived by the respondents.

Objectives of the Study

Specifically the objectives of the project are:

1. To determine the social acceptability of the Boholanos on the Central Visayas Airport Project considering the following aspects:

    a) Economy
    b) Migration
    c) Community Facilities
    d) Services or Institutions
    e) Historical Values
    f) Land Use
    g) Peace and Order and
    h) Local Community Cooperation

2. To determine the significant implications of the research findings for determination of the airport project.

Review of Previous Studies

As embodied in the Tourism Master Plan (TMP) for Bohol, the plan for the development of an international airport has been initiated. This includes the Panglao Tourism Estate Project or (PITEP). A major component of the project is the development of an international standard airport to service B737 airport operation. The airport project which has began in 1995 has met resistance from the affected major stakeholders like the Resort Operators in Panglao Island, the Bohol Association of Hotel and Resort Owners (BAHRR); the big landowners and communities in the project site, and the NGO's operating in the area. The

Department of Tourism or (DOT), the principal proponent of the project, has done a rigorous community scoping to really ascertain the perceptions of the would-be affected stakeholders.

Approach and Methodology

In the assessment of the potential social soundness and level of acceptability of the project, it was deemed necessary to conduct a perception survey to generate opinion and attitudes regarding the proposed airport project and collect data and information necessary in undertaking the analysis. Interview and investigations were conducted by the Sociological Team. The socio-economic and cultural background of the sampled population was obtained from the Socio-Economic Profiles of the City of Tagbilaran, the municipality of Dauis and Panglao in Bohol Province since these are sites that will be greatly affected.

Sampling

A total sample size of 1,200 household respondents from the target barangays were interviewed. This sample is only about 16% of the total number of households of the two municipalities (7,643) which was chosen purposively for this study. Target for interview were selected local officials or other recognized leaders of the community and the potential project beneficiaries.

Distribution of the sample size is as follows:

Distribution of Samples By City/Municipality and By Barangay

Municipality/City	Barangay	Households	Key Informants
Tagbilaran City (250)			
	Booy	100	8
	Taloto	100	10
	Cogon	50	4
Dauis (450)	Bingag	100	12
	Songculan	100	-
	Tabalong	100	-
	Tinago	75	-
	Mariveles	75	-
Panglao (500)	Bolod	100	3
	Lourdes	100	-
	Poblacion	100	1
	Danao	100	3
	Tawala	100	5
TOTAL SAMPLE		1,200	59

The Survey Questionnaire

The perception survey utilized a two-paged questionnaire both structured and open-ended questions specifically designed to obtain basic information on the following:

1 personal data of the household/key informants
- a) age
- b) household size
- c) birthplace
- d) educational attainment
- e) occupation

2. migration
- a) migration pattern of the household

3. social awareness
- a) awareness of the project
- b) perceived components of airport project
- c) favorable response to the project
- d) perceived effects of the project (negative or positive)
- e) possible benefits and impact of the project

4. perceived changes and problems in the community
- a) observed changes in the locality
- b) perceived local priority problems and their applied or expected solutions
- c) respondents recommendations to solve the problem

5. respondents knowledge and skills to have the chance to work for the project
6. willingness of the respondents to participate in the skills training program
7. community cooperation

Data Collection, Processing and Analysis

The actual survey in Bohol started in May 6, 2000 and ended May 25, 2000. The survey was coordinated with local officials of Tagbilaran City and the two municipalities of Dauis and Panglao, as well as with the Provincial Planning and Development Office (PPDO). Endorsement/Introductory Letters were secured from these authorities and were provided to the Consultant Sociologist and her Enumerators for proper identification purposes.

To ensure the project area coverage, field reconnaissance visits were made before the actual conduct of the survey. The technical team assisted in the identification of the target areas for the study.

A half-day training on how to carry out the interview process and how the survey forms will be filled up was conducted in the three project sites. Enumerators were instructed to record comments or feedback from the respondents or any significant events related to the study.

Accomplished survey questionnaires were organized by the enumerators prior to submission for final editing. Data gathered were subjected to manual and machine edit checks to ensure completeness and accuracy.

The analysis and interpretation of the quantitative data was subjected to frequency and percentage distribution. Other data was analyzed qualitatively.

Survey Limitations

There were some difficulties experienced during the conduct of the survey in the study area and they were as follows:

a) Successful interviews with the key informants or local officials were conducted only during the third visit because of problem of availability. The Focus Group discussion was not successfully undertaken because of this problem. Questionnaires for most of the key informants which were self-administered were not completely responded.

b) Some project stakeholders with high level of awareness towards the airport plan voiced out negative response to the survey questionnaire.

c) Secondary data, specifically brief profile of some barangays covered were not available. Information from the municipal level were therefore utilized.

d) The Socio-economic impact of the airport project were limited only to the feelings and perceptions rather than on objective measures of the proposed project.

CHARACTERISTICS OF THE RESPONDENTS

This section discusses the household respondents and key informants profile. It looks into the profile/characteristics of respondents by municipality, their average age, household size, birthplace, educational attainment and occupation. It is to be expected that these profile would give background information on the social desirability/undesirability of the airport project.

Table 1 shows the characteristics of the household respondents and key informants by municipality, average age and household size.

Table 1
Characteristics of Household Respondents and Key Informants by Municipality, Average Age and Household Size

Municipality	Household Respondent				Key Informants			
	Number	%	Ave. Age	Household	No. Municipality		Ave., Age	Household
Tagbilaran	250	20.8 %	45.66	4.44	22	37.29%	46	5
Dauis	450	37.5%	47.2	5	25	42.38%	51	5
Panglao	500	41.7%	50.	5.6	12	20.33%	53	6
Total	1200	100%	Ave: 47.62	5.18%	59	100%	49.44%	5.23%

Table 1 presents the profile of household repondents and key informants. There are 1,200 household respondents: 250 or 20.8% come from Tagbilaran, 450 or 37.50% from Dauis and Panglao, 500 or 41.7%. The two municipalities of Dauis and Panglao were greatly considered as to number of respondents inasmuch as both municipalities directly belong to Panglao Island.

The average age of the three municipalities is 47.62. In the descending order, Panglao has an average age of 50; Dauis, 47.62 and Tagbilaran, 45.66.

The average household size is 5.18. Panglao has the largest household size of 5.6, followed by Dauis 5.0 and Tagbilaran 4.44%.

There are around 59 key informants. 22 or 37.29% are from Tagbilaran; 25 or 42.38% from Dauis and 12 or 20.33% from Panglao. The average age is 49.44 while the average household size is 5.23.

It could be gleaned from the above table that the average age of key informants are much older by1.82 than their household respondent's average age counterpart. Both groups of respondents (household/key informants) have more or less the same household size of 5.18% and 5.23% respectively.

Table 2
Characteristics of Household Respondents and Key Informants by Birthplace and Municipality

Birthplace	Household Respondents								Key Informants							
	Tagbilaran n=250	%	Dauis n=450	%	Panglao n=500	%	Total 1200	%	Tagbilaran n=22		Dauis n=25		Panglao N=12		TOTAL N=59	
Since Birth	119	47.6	318	70.6	347	69.4	784	65.33	17	77	24	96	10	83	51	86.44
Other Parts of Bohol	82	32.8	91	20.2	88	76.6	261	21.75	3	14					3	5.08
Central Visayas	23	9.2	17	3.8	26	5.2	66	5.5					1	8	1	1.69
Mindanao Areas	15	6.0	20	4.4	34	6.8	69	5.75	2	9	1	4			3	5.08
Other Places	11	4.4	4	1.0	5	1.0	20	1.67					1	8	1	1.69
TOTAL	250	100	450	100	500	100	1200	100	22	100	25	100	12	100	59	100%

Table 2 presents data on characteristics of respondents by birthplace.

A great majority of the household respondents have their respective municipalities as their place of birth, 784 or 65.33%; 261 or 21.75% have other parts of Bohol as their place of birth. Others are from Central Visayas, 5.5% and Mindanao, 5.75%. The number of being born from other places are so insignificant, 20 or 1.67%.

The key informants' profile exhibits almost the same pattern as that of the household respondents. The greater majority, 51 or 86.44% have their respective municipality as their place of birth. However, 3 or 5.08% have other parts of Bohol and Mindanao area as their place of origin.

Table 3
Characteristic of Household Respondents and Key Informants by Educational Attainment and Municipality

Educational Attainment	Household Respondent								Key Informants							
	Tagbilaran n=250	%	Dauis n=450	%	Panglao n=500	%	TOTAL % 1200	100	Tagbilaran n=22		Dauis n=25		Panglao n=12		TOTAL % N=59	
Elem. Undergrad	39	15.6	118	26.2	93	18.6	250	20.8	-		2	8	1	8		
Elem. Graduate	21	8.4	147	32.0	142	28.4	310	25.8	4	18	4	16	-		11	18.6
High Sch. Undergrad.	33	13.2	90	20.0	50	10	173	14.4			4	16	4			
High Sch. Grad.	40	16.0	37	8.22	52	10.4	129	10.7	3	14	4	16	1	8	16	27.1
Col. Undergraduate	42	16.8	24	5.30	38	7.6	104	8.7	4	18	4	16	1	8		
College Graduate	74	29.6	31	6.8	115	23	220	18.4	11	50	7	28	5	52	32	54.3
Other, Coc. NA	1	.04	3	1.0	10	2	14	1.2	-		-		-			
TOTAL	250	100%	450	100	500	100	1200	100	22	100	25	100	12	100	59	100%

Table 3 shows the educational profile of respondents. Majority of household respondents (25.8%) have acquired elementary education; 220 or 18.4% have reached College education, while 289 or 24% have attained high school education. Panglao has the most number of respondents who earned college education or at least college level.

The key informants' profile show that of the 59 respondents, majority (54%) have attained college education; 27% have attained secondary education; and 18% have acquired elementary education.

Table 4
Profile of Household Respondents and Key Informants by Occupation

Occupation	Household Respondent								Key informants					
	Tagbilaran n-250	%	Dauis n=450	%	Panglao n=500	%	TOTAL 1200	%	Tagbilaran N=22	Dauis n=25	Panglao n=12	TOTAL N=29		
Professional, technical, Administrative, Executive, mayor, barangay captain, Clerical work (cashier/clerk)	15	6%	-		29	5.8	44	3.66	8	7	6	21	35.6	
Sales worker, Businessman Proprietor	32	12.8	11	2.43	29	5.99	72	5.99	1	2		3	5.08	
Farmer, Fisherman, Logger	7	2.8	196	43.6	190	38	393	32.69	4	7	2	13	22.03	
Service (Policeman, Security Guard, Driver Housekeeper, Construction worker	126	50.4	216	48	140	28	482	40.34		6	3	9	15.25	
Seaman, overseas workers	7	2.8	4	1.8	8	1.6	19	1.58	-		1	1	1.69	
Others (unspecified Work as govt. employees, retired	63	25.2	21	4.66	99	19.8	183	15.22	9	2	1	12	20.32	
NA	-		2	.4	5	1	7	6						
TOTAL	250	100	450	100	500	100	1200	100	22	25	12	59	100	

It could be gleaned from Table 4 that the greatest number of respondent from the three municipalities belong to the service occupational grouping 40.34%; followed by the farmer, fisherman group, 32.69%. Around 15% have unspecified work. They are either government employees, private employee or retired. The professional group is only 3.66%.

As to be expected, the biggest occupational grouping in the key informant is the professional, 21 or 35.60% followed by fisherman, farmer group, 22.03% and service group, 15.25%

Table 5
Profile of Household Respondents and Key Informants Based on Sources of Income by Municipality

Sources of Income	Household Respondents								Key Informants					
	Tagbilaran n=250	%	Dauis n=450	%	Panglao n=500	%	TOTAL 1200	100	Tagbilaran n=22	%	Dauis n=25	%	Panglao n=12	%	TOTAL N=59%
Salary derived from Practice of Profession	141	56.4	90	20	178	67.8	409	34.08	12		9		9		30 50.84
Income derived from Business	42	16.8	17	9.4	47	9.4	106	8.83	1		-		-		1 1.69
Income derived from services rendered as driving, farming	32	12.8	300	66.6	238	47.6	570	47.5	3		11		3		17 28.81
Pension, Children support	35	14	43	9.55	37	7.4	115	9.58	6		5		-		11 18.64
TOTAL	250	100%	450	100%	500	100%	1200	100%	22		25		12		59 99.98

Household respondents of the three municipalities derive their source of income out of the service they render, 47.5%. This is followed by the salary derived from practice of profession, 34.08% and pension, children support, 9.58%. It is to be noted that Tagbilaran, being a city has majority of its respondents derive their income from practice of profession (56.4%).

Key informants' source of income is salary derived from profession, 50.84%. They are mostly government officials with role of mayor or barangay captain, (Table 4). Around 28.81% of the key informants derive their income from service rendered.

Table 6
Migration Patterns of Household Respondents and Key Informants by Municipality and Previous Place of Abode

Previous Place of Abode	Household Respondents								Key Informants						
	Tagbilaran n=250	%	Dauis n=450	%	Panglao n=500	%	TOTAL % 1200	100	Tagbilaran n=22	%	Dauis n=25	%	Panglao n=12	%	TOTAL N=59 %
Since Birth	111	44	326	72	377	75	814	68	16	73	21	84	9	75	46 77.9
Other parts of Bohol	100	40	77	17	56	11	233	20	4	18	4	14	1	8	9 15.3
Mindanao Area	15	6	30	7	35	7	80	6	2	10			1	8	3 5.1
Central Visayas	16	7	12	3	22	5	50	4							
Manila/Other Part in the Philippines	8	3	5	1	10	2	23	2					1	8	1 1.7
	250	100%	450	100%	500	100%	1200	100%	22	100	25	100	12	100	59 100

Table 6.1 shows that household respondents of the three municipalities have no previous place of abode, other than their place of birth, i.e. Bohol, 814 or 68%, 20% are from other parts of Bohol and 6% are from Mindanao area.

The migration pattern holds true for the key informants, 77% have their respective municipalities as their abode since birth, 15% have as their previous abode other parts of Bohol while 5.1% from Mindanao.

Table 6.1
Respondents Reason for Moving in Bohol

Reason for Moving	Household Respondent								Key Informants							
	Tagbilaran n=250	%	Dauis n=450	%	Panglao n=500	%	TOTAL 1200	%	Tagbilaran n=22	%	Dauis n=25	%	Panglao n=12	%	TOTAL N=59	%
Family and relative live in the area	219	87.6	437	97	165	33	821	68.4			3	12	1	8.33	4	7
Business and employment opportunities	18	7.2	5	1	136	27.2	159	13.3	8	36			1	8.33	9	15
Peace and Order Situation in the Place	8	3.2	8	2	185	37	201	16.7	14	64					14	24
Bought Houses/Lots there					10	2	10	0.9			1	8.33	2	16.66	3	5
Studies	1	.4													29	49
Others (retirement place, too old to move somewhere else)	4	1.6			4	0.8	8	0.7			21	84	8	66.66		
TOTAL	250	100 %	450	100%	500	100%	1200	100%	22	100	25	100	12	100	59	100

Respondents from Panglao, Dauis and Tagbilaran have commonalities regarding reasons for moving in the area. Majority of them (68.4%) moved in the area for familiar reasons, indicating that their families and relative by blood or by marriage affinity live in the areas as shown in Table 6.1.

The table also shows that in the municipality of Dauis, a great majority (97%) moved in the area for family reasons or because their relatives live there. The table also indicates that studies is the least (.4%) reasons for migration in Tagbilaran and even non-existent in Dauis and Panglao. Among the 3 municipalities, it appears that there is greater (27%) business and employment opportunities in Panglao compared to Dauis and Tagbilaran

Most of the key informants, particularly from Tagbilaran moved to the place because of the peaceful and orderly situation of the place (24%). The second reason for coming in is business and employment opportunities, 36%. Such two reasons are complementary.

When asked whether respondents would move somewhere else or stay in the area majority (95%) wanted to stay as perceived in Table 6.2.

Table 6.2
Respondents' Preference for Staying/Moving Out

Preference	Household Respondents				Key Informants			
	Tagbilaran n=250 %	Dauis n=450%	Panglao n=500 %	TOTAL% 1200 100	Tagbilaran n=22 %	Dauis n=25 %	Panglao n=12 %	TOTAL% N=59 %
Staying	201 80.4	443 98	495 99	1139 94.91	22 100	21 84	9 75	52 88.15
Moving Out	43 17.2	7 2	5 1	55 4.6		1 4	2 17	3 5.08
NA	6 2.4			6 .5		3 12	1 3	4 6.77
TOTAL	250 100%	450 100%	500 100%	1200 100%	22 100	25 100	12 100	59 100

Among the three municipalities, 99% of the respondents from Panglao are eager to stay in the area, followed by Dauis with 98%; and 81% from Tagbilaran. An insignificant figure of .5% indicated no interest in the matter at all. Three-forths majority of key informants are to stay in their respective municipalities. Tagbilaran revealed a 100% decision to stay. Only 17% in Panglao are willing to move somewhere else.

Table 6.3
Respondents Reasons for Staying

Reasons	Household Respondents				Key Informants			
	Tagbilaran n=250 %	Dauis n=450 %	Panglao n=500 %	TOTAL % 1200 1 00	Tagbilaran n=22 %	Dauis n=25 %	Panglao n=12 %	TOTAL N=59 %
Family lives in the area, birthplace	109 43.6	335 74	270 59.5	714 59		12		12 20.4
Business employment/opportunities	112 44.8	34 7	160 25.5	306 25	8	1	5	14 23.7
Peace and orderly situation	6 2.4	61 14	55 11	122 11	14	5	4	23 38.9
No relocation site	22 8.8	19 4	4 .8	45 4		1		1 1.37
Others (old age)		1 .2	6 1.2	7 .5				
No Answer	1 .4		5 1	5 .5		6	3	8 15.23
TOTAL	250 100	450 100		1200 100	22	25	12	59 100

Major reasons why majority 59% respondents from the three municipalities would not want to move somewhere else is due to the fact that they were born in the area and that it is their native land, also their families live there.

Respondents from Dauis (74%) shows the great majority among the 3 municipalities who is perceived to stay in that area for family reasons and also the area is their native land and birthplace. Tagbilaran shows the highest indicator for business and employment opportunities, 44.80%. While it is perceived that 14% of the people in Dauis are satisfied with the place's peace and order situation to Panglao's 11%. It can be noticed that in

Tagbilaran, peace and order is not the respondents' reason at all for staying Table 6.4 indicates. A total of 1% from these municipalities indicates no interest in the matter by stating no answer.

In a descending order, key informants from 3 municipalities opted to stay due to the place's peacefulness and orderliness of the place, 39% followed by business/employment opportunities, 23.7%. Third reason is that it is the place where their families live, 20.4%. Again, Tagbilaran informants 14 out of 22 affirms its decision to stay because of peace and order situation there which readily provide for a conducive business setting.

THE STUDY AREA

I. Social and Economic Characteristics of the Surveyed Population

Panglao Island:

Population

Panglao Island consists of two municipalities, namely: Dauis and Panglao. These municipalities registered a total population of 42,136 persons in 1995 with Dauis and Panglao representing 57.1 percent and 42.9 percent of the population, respectively (NSO, 1995).

Panglao accounts for 3,156 households while Dauis registers 4,487 households. Panglao has a mean population density of 4.55 persons per hectare. The total population of Panglao Island represents about 4.4 percent of the total provincial population. No cultural minorities or ethnic communities are situated in the island.

Migration

In Panglao Island, there is no official migration data obtained from the area. Informal accounts on the influx of migrants and tourists indicate that only foreigners buying land through their spouses with some settling down in the island is growing trend.

Those of working age are leaving the island towards Manila and other Mindanao areas in search for better opportunities but with the growing island tourism industry, several have come back to attend to their properties.

Educational Level

Panglao residents' educational profile is not very optimistic. Those who have attained the college level is only at a least percentage of 7.6%, while the biggest percentage are those who have attained elementary education (28.4%).

As revealed in the socio-economic survey results Panglao and Dauis have registered the highest percentage of households who are elementary graduates with 32% and 28%, respectively.

In Panglao Island, there are 24 elementary schools as per records from the EcoProfile of Panglao Island. In every barangay, there are elementary schools. The teacher-pupil ratios are 1:30 for Dauis and 1:29 for Panglao town. Dauis has two public high schools while Panglao town has two government-run and a privately owned one. There are no tertiary educational institutions in the island.

Occupation of Households

Income of the majority of the households stem largely from agriculture as reported to have the highest percentage distribution (of 38% for Panglao Island municipalities). Secondary to major income source is from service related works which is 28%.

Household Income and Living Standard

Based on the reports gathered from the Ecoprofile of Panglao Island, majority of the households surveyed (61%) have incomes below the regional level's annual poverty threshold for a family of six which is ₱42,779 a year representing only ₱3,565 income per month. About 45% however, are in to more difficult situation since income is less than the regional annual food threshold for 6 member households which is ₱28,284 or a monthly income of ₱2,357. Still there were families reported to have an income of only ₱8,284 per year. The highest income earner which constituted the least percentage of 1% were reported to have an income of ₱ 202,779 to ₱402,708 annually.

Settlement Pattern

The settlement pattern in Panglao Island is a combination of nucleated type, segmented lineal as well as dispersed type. The nucleated type is evident in the moderately compact poblacions in both municipalities representing the urban core. And in an urban area, there are presence of a church, the plaza, the municipal hall and a small commercial section. In Panglao town, 18.16 % of the population live in the poblacion. In Dauis, only 8% are found in the town center. Houses are in permanent to semi-permanent structures.

A characteristic of segmented lineal type are the houses found along the national, provincial and barangay roads. Those in dispersed settlements are away from the road network. The center of the barangay is marked by a barangay hall, small barrio chapel , an elementary school and a crude basketball court.

Economic Characteristics

Agriculture

The economy of Panglao Island used to be predominantly agricultural with farming and fishing as the main production activities, but in the past years, the shift in the island's economic base occured when in 1997 these two activities was about to lose its dominant role in the island's economy.

Its in 1997 when most of the households are engaged in farming as represented by about 46% and 14% are engaged in fishing as a supplementary to its main source of income. Considering Panglao's proximity to rich fishing grounds, fishing seemed to be the only potential source of income for island inhabitants. It is largely on a small-scale basis. In the municipality of Panglao, out of 880 bancas, only 16% are motorized and the reported fish catch has an average of 23,895 kg. per month.

Apart from the municipal fishing, some island residents are engaged in fishfarming with seaweed culture farms (30) fish cages (8) and fish pens (2).

Industry, Commerce and Trade

The most recent data gathered from the municipality for the inventory of business establishments there were a total of 294 industrial and commercial establishments. Industry has also grown a remarkable growth. Other than resorts, business establishments had increased in number. These consisted mainly of variety stores, fishing supplies and retail stores and bakeshops and motorbike rental service.

There are two PLDT toll stations, one rural bank, a gasoline station, a drug store, a trucking and hauling shop and one cockpit at the Poblacion. The average income from business ventures is P24,276 per year.

Tourism

In Panglao Island, tourism has become a major non-agricultural economic activity in the island. Under Proclamation No. 1081 in 1978, Panglao Island was declared a Tourist Zone and then placed under the Integrated Protected Areas (IPAS) by virtue of DENR Proclamation No 2152 in 1981. With the establishment of the Bohol Beach Club in 1984, the island received a big boost in tourism.

The main tourist attractions of the island are mainly beach and water-based and available facilities are for snorkeling, diving, sailing, swimming and island hopping as well. There are also historical and scenic attractions in the island

and most famous ones are the Dauis's Church, Hinagdanan Cave, Castillo de Corazon de Jesus and the Bell Tower. One of the most popular beach resorts in the island frequenteds by celebrities and diplomats is the Jul Resort and the Blue Sky Sea Resort. The underground springs also contribute to the island's allure. The tourism industry of the island caters to both domestic and foreign visitors.

Transportation and Infrastructure

Panglao Island is reached mainly through Tagbilaran City which is linked to the island by two concrete bridges. The road transport system plays a major role in providing access to the island. Most of the road surface now is of asphalt.

Mini-buses and jeepneys provide public transport from the Tagbilaran City Auxillary Terminal. Tricycles also service short trips from Tagbilaran to Dauis and occasionally up to Panglao town on special trips. Sea and air linkages to provinces are principally served by the Tagbilaran port and airport. The Tagbilaran port serves Cebu, Manila, Siquijor, Dumaguete and Mindanao routes. Even with suspension of flights to Cebu, Tagbilaran/Panglao is linked to Cebu through frequent trips made by the fast craft ferries.

On the water supply system, the main sources of water in the island are deepwells. There are still three barangays not served by water in the municipality of Panglao and these are Brgys. Libaong, Bolod and Tawala. Development of water supply in the area is under the development program of CVWSP or the Central Visayas Water and Sanitation Project.

Electric power is supplied by the National Power Corporation (NAPOCOR) to the whole province of Bohol, distributed by the Bohol Electric Cooperatives (BOHECO). All municipalities in the province are energized.

Telephone Services are provided through PLDT public calling stations. The Bohol Beach Club is the only area with a direct telephone connection.

All the barangays rely on radio communications providing each barangay with 2-3 radio units.

Waste disposal system in the island is open dumping and collection of garbage is done by dump trucks on a daily basis and brought to the dumpsite for burning.

HOUSEHOLD PERCEPTION SURVEY RESULTS: (AWARENESS, IMPACT, PERCEPTIONS AND PRIORITY CONCERNS)

1. Social Awareness

Considering the fact that the great majority (76%) of the total respondents from the three municipalities are aware of the project, it will take a short time for the proponents to field out information about the proposed airport project to the remaining 24% who are yet unaware about it.

Of the three municipalities, Tagbilaran City shows more awareness of the project (80%) compared to Dauis and Panglao with 73% and 79% awareness, respectively.

The key informants on the other hand, are very much aware, possibly so, in as much as they comprise mostly of the government officials of their respective municipalities.

Sources of information of the majority of respondents from the 3 municipalities is the neighborhood (41%); specifically in Panglao with 56%. In Tagbilaran, however, the common source of information is the media with 56% considering that Tagbilaran is to media. While in Dauis, public/local official (36%) play a very significant role in the information campaign for the airport project.

The same is true with the key informants' source of information, the media is the most commonly utilized source. This holds through in Tagbilaran City where most of the key informants are situated. The neighborhood is their secondary source of information.

Generally, the level of awareness about the project is high among the surveyed residents.

2. The Social Acceptability

In Bohol, about 72% of the interviewed respondents are in favor of the airport project plan, the remaining 28% who are against it have varied reasons for opposing. A higher percentage on the social acceptability of the project is evident on the key informants' side since 83% of them are in favor of the plan. Table __ shows the percentage distribution of the respondents favoring the project plan and the varied reasons of those who oppose it.

Table 7.1
Respondents Opinion Regarding Course of Action

Opinion on things to be done before the project is finalized	Household Respondents								Key Informants							
	Tagbilaran n=250	%	Dauis n=450	%	Panglao n=500	%	Total n=1200	%	Tagbilaran n=22	%	Dauis n=25	%	Panglao n=12	%	Total n=59	%
Information Drive	139	55	54	12	77	15	270	22.5								
Conduting a Feasibility Study									3	13.6			4	33.3	7	11.8
Consultation/Assembly meeting with affected residents to assess their opinion	65	26	115	25	123	24	303	25.3	8	45.5	9	36	4	33.3	22	37.3
Relocation with just compensation	12	5	59	13	130	26	201	16.7	10	40.9	8	32			18	30.5
Look for proper funding			51	12			51	4.3			5	20	1	8.4	6	10.2
Infrastructure renovation	4	2	10	3	4	0.1	18	1.5			2	8			2	3.4
Support and cooperation of the public			125	27	19	4	144	12			1	4	3	25	4	6.8
Provision for employment and business opportunities					1	0.1	1	0.1								
Provision for non-disturbance of natural resources					17	4	17	1.4								
Fast finalization of the project	2	0.8			24	6	26	2.2								
Don't pursue the project			7	2	40	8	47	3.9								
NA	28	11.2	29	6	65	13	122	10.2								
TOTAL	250	100	450	100	500	100	1200	100	22	100	25	100	12	100	59	100

Table 7.1 shows that there is a general clamor for a proper relocation area for affected families and that they would be given just compensation for their properties, specially in Panglao (26%). While in Dauis, people believe that support and cooperation of people and the public/local officials (27%) is necessary. Whereas, Tagbilaran folks felt the need for information campaign about the plan (55%). However, respondents of the three municipalities believe that people's perception (25.3%) regarding the project must be known before the plan is finalized.

Table 7.5
Household Respondents/Key Informants' Perceived Effect of Putting Up Airport

	Panglao n=500	%	Dauis n=450	%	Tagbilaran n=250	%	Total n=1200	%	% 100
A. Economy									
Improvement of livelihood in the area and increase source of income whereby improve standard of living	350	70	292	64.8	190	76	832		69.4
Lessen agricultural livelihood of farmers	115	23	62	13.8	24	9.6	201		16.7
Enhance gap between rich and poor	12	23	22	54.9			34		2.8
Little progress or no effect at all	14	2	12	2.7	6	2.4	32		2.7
No comment/no answer	9	2.8	62	13.8	30	12	101		8.4

Household Respondents Perceived Effect of Putting Up an Airport

	Panglao n=500		Dauis n=450		Tagbilaran n=250		Total n=1200	% 100
B. Emploment								
Increase rate in employment	460	92	308	68	175	70	943	78
Priorities landowners								
Depends on educational attainment			26	6			26	2
unemployment	15	3	50	11	14	6	79	6
Normal	25	5	66	15	59	23.2	150	13
None/no comment					2	0.8	2	1
Total	500	100	450	100	250	100	1200	100
C. Trade and Industry								
Improve business opportunities	443	89	350	78	201	68	995	80
(commercial, agricultural, tourism)								
Increase in prices of commodities	18	4	44	10	46	16	108	8.6
(supply and demand, export)								
Promote local product	30	6			22	7	52	4.2
No comment/none	9	1	56	12	25	9	89	7.2
Total	500	100	450	100	294	100	1244	100
D. Migration								
Raise in migration rate	239	48	261	58	211	85	711	59.3
Attract investors	33	6.6	18	4	5	2	56	4.67
Easier to migrate outside	81	16	22	4.9			103	8.58
Dislocation of affected families	72	14.4	84	18.7			156	13
Raise rate in prostitution/illegal transaction	17	3	7	1.6			24	2
Improve standard of living					1	0.4	1	0.8
Increase number of vehicles			2	0.4			2	0.16
No comment/noanswer	58	12	56	12.4	28	12	142	11.84
Normal					5	0.6	5	0.42
Total	500	100	450	100	250	100	1200	100
E. Community/Facility/Service/Institution:								
Transportation								
Increase in fares	128	26	37	8	21	8	186	15
Increase in modern vehicles	142	28	219	48	141	57	502	42
Increase in road accidents/traffic	115	23	52	12	39	16	206	17
conjestion/air pollution								
Convenient travel	115	23	95	21	37	15	247	21
Improve standards of living of			23	5			23	2

	Panglao n=500		Davis n=450		Tagbilaran n=250		Total n=1200	% 100
PUV drivers								
No comment/normal			26	6	12	4	36	3
Total	500	100	450	100	250	100	1200	100
Helth and Sanitation								
1. Pollution								
Increase garbage problem and unsanitary water supply	366	73.2	285	63.3	184	73.6	835	69
Impose proper dumping site/improve drainage system	109	21.8	22	4.9	8	3.2	139	12
Increase medical supply	14	2.8	39	8.7			53	4
Ensure effect (depends to the sanitary inspection	8	1.6	23	5.1	8	3.2	39	4
No comment/normal/no answer	3	0.6	81	18	50	20	134	11
Total	500	100	450	100	250	100	1200	100
2. Housing								
There will be building conjestion due to construction of houses/building	398	80	285	63	133	53.6	816	68
There must be proper relocation alternatives with just compensation	102	20	85	19	69	28	256	21
There will be an increase in migration					1	0.4	1	0.8
Normal/no answer			80	18	47	18	127	10.4
Total	500	100	450	100	250	100	1200	100
3. Education								
Increase in number of new schools	172	34	122	26			294	25
Increase in number of students	155	31	70	16			225	19
Education is prioritized (quality)	117	24	135	30	197	79	449	37
Disruptive to students	32	7	43	9	1	1	76	6
More tourism courses	12	2	33	7	52	20	45	4
Normal/no answer	12	2	47	10			111	9
Total	500	100	450	100	250	100	1200	100
4. Sports and Recreation								
New health and sports centers will be built	261	52.2	145	32.2	18	7	424	35
People's interest in sport will be enhanced	132	26.4					132	12
Good sites for joggers	66	13.2	81	18			147	13
Players will be be disrupted			76	16.6	134	53	210	17
No comment/no effect at all	41	8.2	148	33	102	40	291	23
Total	500	100	450	100	254	100	1204	100

	Panglao n=500		Oslo n=450		Tagbilaran n=250		Total n=1200	% 100
5. Historical Values								
Will remain unaffected	75	15	68	15.8	46	19	189	15.7
Will change (become weternized or influenced by tourists)	227	55	121	27			348	29
Will fade out including historical site	154	30	90	20	110	44	354	29.5
Attract tourists	14	3	18	4			32	2.7
Depend on individual behavior	13	2.6	6	0.2	4	2	23	1.9
No comment/no answer	17	3.4	147	33	90	35	254	21.2
Total	500	109	450	100	250	100	1200	100
6. Land Use								
Increase demand for land intended for commercial and commercial and recreational use	375	75	211	47	16	6	602	50
Decrease demand for agri-land					26	11	26	2
Paying rights to the landowners may be affected	75	15	126	28			201	17
Normal/no comment	50	10	113	25	208	83	371	31
Total	500	100	450	100	250	100	1200	100
7. Peace and Order								
Increase in crime rate	357	72	264	56	82	33	703	58
New rules to be implemented	79	16	58	14	16	7	153	13
Peace must be controlled by government	10	2	20	5			30	3
No comment/normal/NA	54	10	108	25	152	60	314	26
Total	500	100	450	100	250	100	1200	100

Key Informants' Perceived Effects of Airport Project

	Key Informants Municipality				
	Tagbilaran	Dauis	Panglao	TOTAL	%
A. Economy					
Livelihood					
improved way of living	16	7	5	28	47.5
revenue increase	1	6	1	8	13.5
decrease in farming		3		3	5.1
NAP	5	9	6	20	33.9
TOTAL	22	25	12	59	100
Employment					
increase job opportunity / higher employment rate	15	17	9	41	69.5
decrease in terms of farming employment only for educated	3	1		4	6.8
NAP	4	7	3	14	23.7
TOTAL	22	25	12	59	100
Trade and Industry					
high employment / more industries / business	9	21	8	38	64.4
attracts more tourists	8			8	13.5
increase crop production	1			1	1.8
only for businessman					
less crop production	4	4		8	13.5
NAP			4	4	6.8
TOTAL	22	25	12	59	100
B. Migration					
increase in migration/tourist	11	10	6	27	45.7
easiest way to migrate to other places	2			2	3.4
lessen migration		2		2	3.4
people nowhere to go					
NAP	9	13	6	28	47.5
TOTAL	22	25	12	59	100
C. Community Facilities/Institution, Services					
Transportation					
increase number of vehicles	7	13	5	25	42.4
convenience to travel	8	3	3	14	23.7
high risk of accident		7		7	11.8
NAP	7	2	4	13	22.1
TOTAL	22	25	12	59	100
Health and Sanitation					
more pollution, diseases	12	4	2	18	30.5
more expense in drainage		1	2	3	5.1
cleanliness will be maintained	2	2	3	7	11.8
should be taken care by public officials	8	6		14	23.8
NAP		12	5	17	28.8
TOTAL	22	25	12	59	100
Housing					
more housing projects	12	6	6	24	40.6
more housing problems as relocation, pollution		9		9	15.3
NAP	1			1	1.7
TOTAL	9	10	6	25	42.4
	22	25	12	59	100

	Key Informants Municipality				
	Tagbilaran	Dauis	Panglao	TOTAL	%
Education					
Increased erollment	3	4	4	11	18
needs improvement for education system	7	5	2	14	24
students will be disturbed	3	5		8	14
NAP	9	11	6	26	44
TOTAL	22	25	12	59	100
Sports					
more sport facilities will be needed	8	8	7	23	39
no effect	2	3		5	8
NAP	12	14	5	31	53
TOTAL	22	25	12	59	100
D. Historical Values					
will still be the same	8	3	2	13	22.1
changed values	3	6	3	12	20.3
NAP	11	16	7	34	57.6
TOTAL	22	25	12	69	100
E. Land Use					
still the same/normal			4	4	7
conversion from agri to commercial	10	7	1	18	31
increase in value		3		3	5
will be lost		2		2	3
NAP	12	13	7	32	54
TOTAL	22	25	12	69	100
F. Peace and Order					
still remain normal/same	1	8		9	15.3
not stable			1	1	1.7
needs more security	14	14		28	47.4
increase rate of crime		3	5	8	13.5
NAP	7		6	13	22.1
TOTAL	22	25	12	59	100

Respondents' Effects of Putting Up An Airport

a. Economy

As shown in Table 8 a great majority (69.4%) of the total respondents from the three municipalities in Bohol believed that as far as economy is concerned, the project will lead to the improvement of livelihood in the area and increase source of income of the people whereby improve standard of living. Although (16.7%) also fears that the project will jeopardize livelihood of farmers. Others (2%) of the total respondents – an insignificant number thinks there will be little progress or even no effect at all to the economy.

b. Employment

It also shows people's perception that there will be an increase in employment and business opportunities (79%) for the folks of Panglao, Dauis and Tagbilaran as the effect of the project. A significant few (11%) felt it would result to unemployment, others (7.8%) expressed no comment while .29% felt no changes at all.

c. Trade and Industry

Majority (80%) are optimistic that business opportunities will abound both for local and outside investors thereby increasing ventures in tourism, commerce and agri-business. As a result, however, there were some who fear (8%) that prices of commodities will escalate given the influx of consumers affecting demand and supply of commodities in the area.

d. Migration

While the 59% raise in migration rate from the combined responses of respondents from the three municipalities, it is perceived that there will be an influx of people from outside coming to migrate in the area. There is also fear that affected families will be dislocated (13%).

e. Community, facility, service, institution

e.1 Transportation

The three municipalities have common perception regarding increase (42%) in volume of modern vehicles plying their local roads. While 21% perceived convenience when travelling. However, 18% fear there will be an increase in road accidents as a result of the increase in volume of vehicles. There are people, though, who believe that there will be (2%) an improvement in standard of living, as far as drivers of PUJ are concerned.

e.2 Health and Sanitation

The influx of people and vehicles will increase rate of pollution problem (69%) in the area. There will also building conjestion (68%) due to construction of houses and new building establishments as a result of

migration and new business ventures brought about by outside and local investors.

e.3 Education

Respondents from the three municipalities have common belief that education must be given priority by the local government (37%), concentrating on the quality on instruction. There was also high (25%) belief that the project would lead to construction of new schools and college particularly in Panglao area.

e.4 Sports and recreation

People perceived that the project will lead to construction of health and sports centers (37%). This is greatly felt in Panglao (52%). While 53% among residents of Tagbilaran believe that the project will disturb players. Whereas, people from Dauis (33%) said no comments about the matter and some even believed there will be no effect at all as far as sports and recreation aspect are concerned.

e.5 Historical Values

Panglao folks perceived that people's values will change (55%) due the influence of migrants, tourists; while Tagbilaran people believes that historical values including historical sites (44%) will fade as a result of this project. Majority (83%) in Dauis expressed no comment regarding the matter.

e.6 Land Use

People in Panglao (75%) and Dauis (47%) perceived that the project will raise demand for commercial and recreational land; while a great majority (83%) from Tagbilaran made no comment at all, or that land use will not be affect or that it will remain normal.

Noticeably enough, respondents from Panglao (72%) and Dauis (56%) perceived an increase in crime rate, while those from Tagbilaran (60%) gave no comment, or their life will still be normal.

Key Informants' Perceived Effects of the Airport Project

A. ECONOMY

Livelihood

Majority of the key respondents, 47.4% perceives the airport project as one way to improve way of living, 13.5% that the project could help increase the revenue. However, it should be noted that around 33% of the respondents did not give any response/comment to the project.

Employment

A greater majority of the key informants 69.5% believe that the airport can help increase job opportunities which would lead to higher employment rate. However, around 6.8% have negative perceptions that the project would lead to decrease in land donated to agriculture.

Trade and Industry

A greater majority of the 64.4% key informants from the three municipalities believe that the project would lead to more industries/business, 13.5% believes that the project would lure tourists. However, also 13.5% reasons out that the project are only good for those involved in business. There are also those who fear, 6.8% that the project would lead to lesser crop production, since most of the residents would be concentrating more on the airport peripheries.

B. MIGRATION

Key informants, 45.7% are of opinion that the project would lead to in-migration. The case of Tagbilaran City, which has the greatest number of migrants among the three (Table 8) would possibly happen in any research sites of the alternative site. However, it should be noted that almost half of the respondents, 47.5% did not give any comment/response on the topic.

C. COMMUNITY FACILITIES, INSTITUTION, SERVICES

Transportation

Almost one-half (½) of the key informants 42.4% are of the opinion that project would lead to increase number of vehicles. Such increase in the number are deemed convenience for the riding public. However, around 11.8% harbor feelings that such increase in vehicle would lead to high risk of accident.

Health and Sanitation

Around 30.5% of the key informants are of the notion that the project would cause more pollution as noise, air that would readily give to way to diseases. However, this has been cautioned by their own perception that cleanliness should be maintained and the project should be taken cared by public officials, 11.6% and 28.8% respectively.

Housing

40.6% believe that more housing projects will be undertaken, as an outcome of the development of the project. However, 15.3% are of the contention, there will still be housing problems brought about by relocation.

Education

More than half of the respondents are of the opinion that there will be changes in the education pattern. There will be increased enrollment as perceived by 18%. Another 24% feels the need for improving it while around 14% are still with disturbed belief that students will be disturbed brought about by instant rise of buildings, industries, entertainment, etc.

Sports

More sport facilities are envisioned by at least 39% of the respondents.

Historical Values

Key informants 22.1% are of the perception that historical values will still be the same inspite of the introduction of new lifestyle by the supposed migrants. A more or less equal percentage of respondents, 20.3% believes that the project would bring about changed values.

Land Use

Around 7% of the respondents are of the belief that the land use of Bohol would still be the same. However, 31% fears the conversion from agricultural to commercial. Another 3% believes that their lands will be lost. At least, 5% are of the positive notion that there will be increases valuation of land.

Peace and Order

Almost half of the respondents 47.4% have felt the need to strengthen the security of the place in case the project is to push through. This felt need is based on their fear that the place will not be stable anymore, 1.7% this is in contrast to the original idea, of staying in the place because of its peacefulness and orderliness (refer to Table). This fear of instability is compounded with the increase rate of crime as perceived by 22.1%.

Table 9

Perceived Benefits of the Airport Project

	Household Respondents					Key Informants				
	Tagbilaran	Dauis	Panglao	TOTAL	%	Tagbilaran	Dauis	Panglao	TOTAL	%
Perceived Benefits for the Municipality										
Upgrade Standards of More Revenue	207	257	348	812	67	12	15	3	30	50.8
More Jobs Opportunities	23	147	150	320	27		10	5	15	25.4
Convenience		40		40	4	8			8	13.6
NA	20	6	2	28	2	2		4	6	10.2
TOTAL	250	450	500	1200	100	22	25	12	59	100
B. Perceived Benefits for the Household										
Job opportunities	103	157	239	499	42					
Increase Land Valuation		78		78	6		2		2	3.4
Employment/Additional Income		27	144	171	14	3	20	8	31	52.5
Convenience						10		2	12	20.4
Nothing/NA	64	14	33	111	10	9	3	2	14	23.7
No Benefits/NA	83	174	84	341	28					
TOTAL	250	450	500	1200	100	22	25	12	59	100

This table shows that there is commonality among people in the three municipalities as regards benefits they will get from the project. A greater majority believed (67%) upgrading standard of living of their people thereby (27%) job opportunities will lessen unemployment rate in their respective areas.

Majority of the key informants 50.84% involved in government offices envisions the project as one source of revenue, 25% of the key informants envisions the project as one of potential job opportunities.

Table 9 shows that while there are noticeable percentage among respondents in Panglao 17%; Dauis 32%; and Tagbilaran 33%, who either refrained from giving answers, or expecting no benefit at all, majority 42% of the total respondents from the three municipalities believed that household folks will benefit from the project theory job opportunities.

Key informants 52.4% are of the related idea that the projects can contribute to additional income through employment.

Table 10
Perceived Changes During the Last 5 Years

Perceived Changes	Household Respondents								Key Informants							
	Tagbilaran		Dauis		Panglao		Total		Tagbilaran		Dauis		Panglao		Total	
	n=169	%	n=466	%	n=455	%	n=1029	%	n=27	%	n=29	%	n=52	%	n=108	%
Economic/Livelihood																
Development of a new business	17	10.1					17	1.6			4	11			4	
Increase prices of commodities					6	1.3	6	0.6								
Tourism			105	26	72	15.8	177	17.2	6	29	8	22	1	8	15	13.8
Rapid increase of land valuation											5	14	1	8	6	
Morality																
Changed value system			3	0.7	15	3.3	18	1.7			5	42	5	42	10	
Prolifiration of drug addiction, prostitution, gambling																
Infrastructure																
Cemented roads, new buildings	65	38.7	186	46	186	40.8	437	42.5	13	35	5	42	18		36	33.3
Basic Services																
Increased number of transportation	14	8.4	5	1.3	19	4.2	38	3.7								
Improved lighting/water system			80	19.7	80	17.6	160	15.5								
Increased in number of houses																
Environmental/Technological																
Better methods of farming			5	1.3	5	1.1	10	0.9	7	19	1	8	24		32	29
Polluted environment																
Population growth rate	61	36.3	15	3.7	72	15.8	148	14.4								
NA/None	11	6.5	7	1.7			18	1.7	1		1	1	3		5	

Table shows that for the three municipalities, there was a significant change as far as infrastructure is concerned with respondents high responses of 38.7% for Tagbilaran. In Panglao, there is also a noticeable improvement in the same aspect with 40.8% response rate. A noticeable change (19.7%) is seen in Dauis regarding basic services due to the improvement of lighting / water system. Whereas in Tagbilaran, population increased significantly with 36.3 response rate from the area.

From the multiple responses of 59 or 55% of the key informants, have noticed pollution in the environment, followed by infrastructure, 33.3% as cemented roads and new buildings.

(May 2000)

CATEGORY OF RESPONSES	Cogon (N=50)	Tacoto (N=100)	Booy (N=100)	Total (250)
I. PERSONAL DATA				
1. Average Age	47	43	47	
Range	(20-77)	(18-80)	(19-80)	
2. Birthplace				
- Since birth	20	55	42	117
- Other parts of Bohol	19	26	37	82
- Central Visayas	5	7	11	23
- Mindanao Areas	6	6	5	17
- Luzon Areas	-	6	5	11
TOTAL =	50	100	100	250
3. Educational Attainment				
- Elementary undergrad	10	17	12	39
- Elementary graduate	3	10	8	21
- High School undergrad	9	8	16	33
- High School graduate	5	17	18	40
- College undergrad	14	16	12	42
- College graduate	9	32	33	74
- Vocational	-	-	1	1
TOTAL =	50	100	100	250
4. Occupation				
- Professional/technical/government employee	20	19	23	62
- Salesworker/businessman	4	15	13	32
- Farmer/fisherman	-	3	4	7
- Service (Policeman, security guard, driver, councilor)	4	12	9	25
- Laborer/carpenter/plumber	10	11	17	38
- Seaman, overseas worker	-	3	4	7
- None/housekeeper/pensioner/retired	12	37	30	79
TOTAL =	50	100	100	250

CATEGORY OF RESPONSES	Cogon (N=50)	Tacoto (N=100)	Booy (N=100)	Total (250)	
5. Household Size Average	5	5	5	-	
6. Main Source of Income					
- Salary	26	53	63	142	
- Income derived from business (farming/fishing)	10	9	18	37	
- Income derived from services	-	27	9	36	
- Pension, children support	14	11	10	35	
- Allotment/remittance	-	-	-	-	
TOTAL =	50	100	100	250	
II. MIGRATION					
1. Where did you previously live?					
- Since birth	22	55	35	112	45%
- within Bohol	18	34	48	100	40%
other Visayas	6	4	6	16	6%
- Mindanao	4	4	7	15	6%
- Manila	-	3	2	5	2%
- Other Luzon	-	-	2	2	1%
TOTAL =	50	100	100	250	100%
2. Why did you move here?					
- Since birht /Not applicable	22	55	35	112	45%
- Get married here	9	7	31	47	19%
- Bought a lot & build a house	8	21	18	47	19%
- Looking for a job/ employment	3	2	-	5	2%
- Wife/husband assigned to work here	4	1	2	7	3%
- to stay with family/relatives	2	1	3	6	2%
- to work & stay with children	2		3	5	2%
who are studying					

CATEGORY OF RESPONSES	Cogon (N=50)	Tacoto (N=100)	Booy (N=100)	Total (250)	
boring to stay in one place		1		1	
- If we will be relocated to other area	1	1	1	3	
- others					
TOTAL =	-	-	-	-	
III. SOCIAL AWARENESS					
1. Are you aware of the proposed project in your area?					
- Yes	42	87	72	201	81%
- No	8	13	28	49	19%
TOTAL =	50	100	100	250	100%
* Respondents sources of info (multiple responses)					
- neigborhood	27 #	28	18	73	30%
- local official	13	12	8	33	14%
- media	41	50	44	135	55%
- others			2	2	1%
TOTAL =	54	62	54	170	100%
2. Are you in favor of this plan?					
- Yes	39	84	60	183	73%
- No	11	16	40	67	27%
- If no, why?					
TOTAL =	50	100	100	250	100%
many residents will be affected	6	10	16	32	47%
can cause pollution (air/noise)			14	14	21%
no relocation site for us		5	8	13	19%
the location is very small	3			3	5%
the city will be over-crowded	1			1	2%
no benefit			2	2	3%
others	1	1		2	3%
TOTAL =	11	16	40	67	100%

CATEGORY OF RESPONSES	Cogon (N=50)	Tacoto (N=100)	Booy (N=100)	Total (250)	
3. In your opinion, what things should be taken before the place is finalized					
- Public announcement/ inform all affected residents	28	46	55	129	52%
- Safety of the people fesibility study/ barabgay survey/ more observation	17	34	12 14	12 65	5% 26%
- gov't. should relocate the people/ people relocation site	2	8		10	4%
- gov't. should pay		2		2	1%
- others		1		1	1%
- no comment	3	9	13	25	10%
- none			6	6	2%
TOTAL =	45	91	13	250	101%
What do you think will be the affects in putting up an airport in this areas in terms of:					
4. ECONOMY					
4.1 *Livelihood*					
- increase in livelihood programs/projects livelihood problem will be solve	34	69	87	190	76%
- inscrease in livelihod problem/ decrease in livelihood projects	8	15	3	26	10%
- normal		2	4	6	2%
- no comment	8	14	6	28	11%
TOTAL =	50	100	100	250	99%

CATEGORY OF RESPONSES	Cogon (N=50)	Tacoto (N=100)	Booy (N=100)	Total (250)	
4.2 Trade and Industry					
- Increase in tourism industry/ improve tourism	44	69	44	157	63%
- Decrease in crop production	6	12	9	27	11%
- Increase in crop production		4	15	19	8%
- Promote our own products		15	7	22	9%
- No comment			25	25	10%
TOTAL =	50	100	100	250	100%
4.3 Employment					
- more job opportunities	41	79	55	175	70%
- unemployment	7	13	39	59	24%
- normal			2	2	1%
- no comment	2	8	4	14	6%
TOTAL =	50	100	100	250	101%
5. Migration					
- increase the No. of migrants/ easy to migrants	30	69	88	187	75%
- over population	17	9		26	10%
- attract tourist					
- ttract investors		5		5	2%
- increase in No. of vehicles		1		1	1%
- normal		2	5	7	3%
- no comment	3	14	7	24	9%
TOTAL =	50	100	100	250	100%
6. Community Facilities, Services or Institution					
6.1 Transportation					
- increase in no.of vehicles	27	37	79	143	57%
- traffic problem	5	16	18	39	16%
- fast & convient to travel	4	32		36	14%
- increase of operating cost	14			14	5%
- normal		1		1	1%

Municipality of Tagbilaran
(May 2000)

CATEGORY OF RESPONSES	Cogon (N=50)	Tacoto (N=100)	Booy (N=100)	Total (250)	
- fare increase		5	2	7	3%
- no comment		9	1	10	4%
TOTAL =	50	100	100	250	100%
6.2 *Health & Sanitation*					
- Pollution environment	10	30	44	84	34%
- Still clean/ clean & healty environment	28	35	52	115	46%
- more drainage	8			8	3%
- it's the gov't. responsibility		7		7	3%
- not sure of affect		1		1	
- normal	1	12		13	5%
- no comment	3	15	4	22	9%
TOTAL =	50	100	100	250	100%
6.3 *Housing*					
- Increase in number of housing	14	26	67	107	43%
- increase in number of housing problem	26			26	10%
- some house will be affected	7	44	18	69	28%
- decrease in housing problem			2	2	1%
- some will migrate		1		1	1%
- normal		7	1	8	35%
- no comment	3	22	12	37	15%
TOTAL =	50	100	100	250	133%
6.4 *Education*					
- class desturbance because of noise	43	74	80	197	79%
- advantages to students		3		3	1%
- Normal		7	15	22	8%
- no comment	7	16	5	28	12%
TOTAL =	50	100	100	250	100%

Municipality of Tagbilaran
(May 2000)

CATEGORY OF RESPONSES	Cogon (N=50)	Tacoto (N=100)	Booy (N=100)	Total (250)	
sports					
6.5 *Sports & Recreation*					
- Affected by noise/ it will be affected	45	42	47	134	54%
- increase of recreation			18	18	7%
- normal		22	17	39	16%
- no comment	5	28	18	51	20%
- no effects		8		8	3%
TOTAL =	50	100	100	250	100%
7. *Historical Values*					
- Lost of historical site		16	35	51	20%
- Some values will be lost/ fade out	30	16	13	59	24%
- normal		28	18	46	18%
- depends on the people		6		6	2%
- no comment	20	34	34	88	35%
TOTAL =	50	100	100	250	99%
8. *Land Use*					
- Little vacant place	2		8	10	4%
- lost of property/ lot		16		16	6%
- agricultural land are will be decreased		16		16	6%
- normal		14	7	21	8%
no comment	48	54	85	187	75%
TOTAL =	50	100	100	250	99%
9. *Peace & Order*					
- Improve		9	7	16	6%
- crime rate increase	22	20	40	82	33%
- normal	17	48	45	110	44%
- no comment	11	23	8	42	17%
TOTAL =	50	100	100	250	100%
10. What benefits would an airport project provide to the people in the municipality & in the provinvce					
- Provide income in the province/ gov't.	36	60	73	169	68%

CATEGORY OF RESPONSES	Cogon (N=50)	Tacoto (N=100)	Booy (N=100)	Total (250)	
employment opportunity both transportation facility	7	4	4	15	6%
- tourism		25		25	10%
- development of the province			23	23	9%
- no comment	7			7	3%
TOTAL =	50	11	100	11	5%
		100		250	101%
11. What are benefits to you & to your household in particular					
- job opportunities	25	36	42	103	41%
- provide easy & convinient travel/ better transportation facilities	7	25	32	64	26%
- noting	18	15	26	59	24%
- no comment		24		24	10%
TOTAL =	50	100	100	250	100%
IV. PERCEIVED SOCIAL CHANGES AND PROBLEMS IN THIS COMMUNITY					
1. Have you observed any changes to the environment or your community during the past 5 years.					
- Yes	41	67	63	171	68%
- No	9	33	27	69	32%
TOTAL =	50	100	90	240	100%
2. If yes, what changes					
- population increase	20	27	10	57	33%
- increase in the number of houses & building	12		48	60	35%
- development of business		21		21	12%
- increase in transportation	6	8		14	8%
- roads are improved	3	7		10	6%
- population		3		3	2%
- peace & order			4	4	2%
- destruction of facilities			1	1	1%
- None		1		1	1%
TOTAL =	41	67	63	171	100%

Municipality of Tagbilaran
(May 2000)

CATEGORY OF RESPONSES	Cogon (N=50)	Tacoto (N=100)	Booy (N=100)	Total (250)	
3. What do you think are the most pressing problems in th community?					
- employment problem	12	34	28	74	30%
- waty	14	13	22	49	20%
- drug addiction	17	9	15	41	16%
- population		10	23	33	13%
- over population		17	12	29	12%
- economic crisis		12		12	5%
- others	2	5		7	3%
- none	5			5	2%
TOTAL =	50	100	100	250	101%
4. Are you willing to contribute your time to participate in possible skills training program?					
- YES	45	70	70	185	
- NO	11	11	3	25	
- MAYBE	44	19	27	90	
TOTAL =	100	100	100	300	
5. Are you aware of any existing organization in this area?					
- YES	87	75	86	248	
- NO	13	25	14	52	
TOTAL =	100	100	100	300	
If YES, what are they?					
- Religious Organization	17	16	24	57	
- Farmer's Association/Bantay-Dagat	14	24	46	84	
- Women's Organization	20	14	16	50	
- Senior Citizen's Association	5	8	-	13	
- Cooperatives	20	5	-	25	
- School Organization (PTA)	5	-	-	5	
- NGO's	-	8	-	8	
- BHW	6		-	6	

Municipality of Tagbilaran
(May 2000)

CATEGORY OF RESPONSES	Cogon (N=50)	Tacoto (N=100)	Booy (N=100)	Total (250)
- PYM	-		-	-
Driver's Association	-		-	-
Purok Organization	-		-	-
Business Organization	-		-	-
Civil Organization/Rotary	-		-	-
A lot of organization	-		-	-
Youth organization	-		-	-
TOTAL =	87	75	86	248

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Dauis
(May 2000)

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
I. PERSONAL DATA						
1. Average Age	47	47	48	49	45	-
Range	(21-83)	(22-75)	(20-91)	(22-82)	(18-81)	
2. **Birthplace**						
- Since birth	73	38	69	58	80	318
- Other parts of Bohol	20	29	19	9	14	91
- Central Visayas	5	3	4	2	4	18
- Mindanao Areas	-	5	6	5	2	18
- Luzon Areas	2	-	2	1	-	5
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**
3. **Educational Attainment**						
- Elementary undergrad	29	19	23	20	27	118
- Elementary graduate	36	28	24	41	18	147
- High School undergrad	11	16	26	6	29	88
- High School graduate	12	3	3	3	16	37
- College undergrad	3	3	11	3	4	24
- College graduate	7	5	11	2	6	31
- Vocational	2	1	2	-	-	5
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**
4. **Occupation**						
- Professional/technical	7	4	3	3	5	22
- Salesworker/businessman	6	3	3	3	4	19

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
- Farmer/fisherman	21	13	15	44	29	122
- Service (Policeman, security guard, driver,, councilor)	17	4	8	4	6	39
- Laborer/carpenter/plumber	15	17	25	9	-	66
- Seaman, overseas worker	3	-	-	1	16	20
- None/housekeeper/pesioner	31	34	46	11	40	162
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**
5. **Household Size (Average)**	4	5	4	5	5	-
6. **Main Source of Income**						
- Salary	22	4	19	5	38	88
- Income derived from business (farming/fishing)	34	31	33	56	35	189
- Income derived from services	32	33	40	10	12	127
- Pension, childred support	7	7	6	4	9	33
- Allotment remittance	5	-	2	-	6	13
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**
II. **MIGRATION**						
1. **Where did you previously live?**						
- Since birth	72	54	64	56	80	326
- Other parts of Bohol (Tag. City, Bingay, Garcia Hemandez, Loon, Carmen, Loboc, Tubigon etc.)	18	12	25	10	12	77
- Mindanao Areas (Zamboanga, Iligan, Davao, Misamis Occ., Cagayan de Oro, etc.)	6	7	9	5	3	30
- Central Visayas Region (Cebu, Negros, Leyte, etc.)	4	2	1	2	3	12
- Manila			1	2	2	5
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
2. **Reasons for moving in the area**						
- Since birth / Not applicable	72	54	64	56	80	326
- Got married here.	13	18	13	14	16	74
- Wife presently residing here/husband is from here/family is here.	8	-	7	3	-	18
- Acquired lot here.	3	-	9	2	-	14
- Parents transferred here/have cousin here.	2	2	1	-	2	7
- Peaceful place here.	-	-	6	-	-	6
- Have business here.	-	1	-	-	2	3
- Search for greener pasture.	2	-	-	-	-	2
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**
3. **Whether stay or move somewhere if given a chance/and reasons.**						
- Stay	98	73	100	75	97	443
- Move somewhere else.	2	2	-	-	3	7
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**
- This is my hometown/bonafide resident/born in this place	27	12	45	22	35	141
Peaceful place/people were friendly/feel free and happy staying here / away from pollution	25	26	15	14	14	94
- Got married here / house is here / family is here	16	16	12	4	25	73
- Land is good for farming and fishing / agricultural land is here / own a lot here	6	8	24	15	8	61
- Occupation is here / source of income is here	15	3	-	5	7	30
- I love this place	5	-	-	14	8	27
- I'm old enough	3	8	4	1	3	19
- To look for better source of income / to find a good job	2	-	-	-	-	2
- Not affected	-	2	-	-	-	2
- Because of the proposal for Intenational Airport	1	-	-	-	-	1
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
III. SOCIAL AWARENESS						
1. Whether or not aware of the proposed airport project?						
- Yes	83	43	98	53	42	319
- No	17	32	2	22	58	131
TOTAL =	100	75	100	75	100	450
R's source of informationa						
- Local officials	25	10	49	21	18	123
- Neighborhood	28	20	7	25	20	100
- Media	30	13	42	7	4	96
TOTAL =	83	43	98	53	42	319
2. Whether or not in favor of the airport plan						
- Yes	69	45	90	11	84	299
- No	31	30	10	64	16	151
TOTAL =	100	75	100	75	100	450
R's reasons for "No" answers						
- Agricultural land that we own will be affected / damage crop production	13	11	4	28	8	64
- Many houses / properties will be affected	6	4	3	14	-	27
- Farming is our priority	5	7	-	3	2	17
- It will cause pollution /noise / can't sleep	5	2	2	4	2	15
- Our business will be affected / will lost our livelihood	-	3	-	8	-	11
- Accidents will happen because transportation will increase.	-	1	-	6	-	7
- We want a peaceful place	-	2	-	-	4	6
- We don't want demolition	2	-	1	1	-	4
TOTAL =	31	30	10	64	16	151

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
3. R's opinion on what things should be taken into an account						
before the plan is finalized?						
- Funding of money / source of budget for the project	8	5	70	3	55	141
- Residential consultation or consult the affected residentials						
and ask if they will agree or not	34	16	-	15	26	91
- Public consultation / hearing	18	19	15	28	8	88
- Have barangay assembly and open forum	8	11	10	10	5	44
- Negotiate with the land owners	17	12	-	8	-	37
- Help each other to accomplish the plan or the people should						
cooperate	4	6	-	-	6	16
- Have a relocation site first for the affected residents	6	6	-	-	-	12
- Stop this proposed plan/have another place for this project	-	-	-	7	-	7
- Repair of national roads first/road concreting	5	-	-	-	-	5
- Not Applicable	-	-	5	4	-	9
TOTAL =	**100**	75	**100**	75	**100**	**450**
Effects of putting up an airport in terms of:						
. Economy						
.1 *Livelihood*						
- Improve / increase the way of living	34	30	6	24	30	124
- More chances to put up business/produce source of income	8	14	25	3	12	62
- Revenue increases/no. of people increases/bigger income						
to the community	40	5	-	2	8	55
- Destruction of life because their land will be lost / farmers						
performance will decrease	3	4	17	18	5	47
- Many people can get a job / good jobs will occur	8	1	8	3	9	29
- Only the educated can avail the benefits	-	2	-	4	14	20
- It gives benefit to the people	-	-	20	-	-	20
- Livelihood will become hard	-	-	-	-	15	15

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
- Disturbance of the livelihood because of the noise	4	1	-	5	-	10
- Normal life of the residents will not be affected	3	3	-	2	-	8
- There will be a big gap between the rich and the poor	-	-	-	2	-	2
- No comment	-	3	17	4	7	31
- NA	-	12	7	8	-	27
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**
4.2 *Employment:*						
- Increase in employment rate	27	29	34	21	58	169
- Job opportunity will increase	26	13	25	10	31	105
- Less vacancy / many will be jobless/decrease in employment	4	4	30	11	7	56
- Higher demand of employment opportunities	30	1	-	-	-	31
- Only the graduates can avail	2	10	-	14	-	26
- More job vacancies	5	5	-	1	-	11
- More chances to have business	2	-	-	-	-	2
- No comment	4	9	11	10	4	38
- NO answer	-	4	-	8	-	12
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**
4.3 *Trade and Industry*						
- Production increases	59	34	36	24	52	205
- Decrease production of crops due to some farms that will be affected	14	14	31	26	5	90
- Increase no. of tourist / tourism increases	6	6	12	-	11	35
- Easy to export products to other country	-	-	-	-	32	32
- More establishments	7	-	6	-	-	13
- Business will improve / invite investors to open business	8	-	-	-	-	8
- Taxes will increase	4	1	-	-	-	5
- More supply, more demand	2	2	-	-	-	4
- Hard to market products	-	-	-	2	-	2

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
- Natural resources will be easily developed	-	1	-	-	-	1
- No comment	-	4	15	15	-	34
- No answer	-	13	-	8	-	21
TOTAL =	100	75	100	75	100	450
5. **Migration**						
- Increase no. of tourist / increase migration	46	17	9	15	22	109
- More people will visit / migrate	15	19	19	8	16	77
- The place will be crowded	-	-	17	25	-	42
- Increase no. of population / residents	7	9	26	-	-	42
- Affected residents will migrate and starts a new life	4	11	-	23	-	38
- Housing problem because of possible squatters	-	-	-	-	27	27
- Many will vacate because of discomfort	-	-	-	-	21	21
- Many establishments will appear/rich people can put up big business	12	7	-	-	-	19
- More prostitutes / more dangerous	3	2	-	-	-	5
- Many illegal transactions may enter	-	2	-	-	-	2
- Standard of living will increase	-	2	-	-	-	2
- No comment	5	2	13	-	14	34
- No answer	8	4	16	4	-	32
TOTAL =	100	75	100	75	100	450
6. **Community Facilities, Services or Institution**						
6.1 *Transportation:*						
Increase in trasportation / no. of vehicles/ no. of passengers and travellers	81	44	23	65	6	219
Easy for us to have a ride due to comfortable roads/ roads will improve	9	8	-	1	48	66
Vehicle operating cost may increase	-	-	37	-	-	37
Traffic problem	8	10	-	-	18	36

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
Frequency of travel will increase in rate	-	-	29	-	-	29
More chances to the drivers to improve their life / they can						
already avail their own vehicle	2	3	-	-	16	21
Many accidents may happen	-	4	-	-	12	16
No comment	-	2	6	5	-	13
No answer	-	4	5	4	-	13
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**
6.2 *Health and Sanitation:*						
- Have proper drainage and disposal of garbage	18	8	39	24	16	105
- Cause pollution / health risks especially children / many						
will get sick	10	13	31	-	46	100
- Needs improvement in water sources / power supply	27	15	12	-	12	66
- Better health condition for government will provide these						
needs	3	10	-	26	-	39
- Not affected	9	6	-	8	-	23
- Needs more hospitals / clinics and medicines	8	2	-	-	-	10
- Less nutrition because the farm will vanish	-	-	-	-	10	10
- Will become worse	4	3	-	-	-	7
- Can easily be maintained	5	-	-	-	-	5
- Will encounter water shortage	2	-	-	-	-	2
- Water contamination due to waste	-	2	-	-	-	2
- No comment	-	2	16	13	16	47
- No answer	14	14	2	4	-	34
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**
3 *Housing*						
- More squatters/increase in no. of houses	20	23	19	-	25	87
- Many houses will be demolished / damage	-	-	14	45	4	63
- Big houses will be constructed/housing projects for the tourists	11	10	29	-	-	50

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
- Affected residents should be relocated	17	9	-	19	-	45
- Give the affected residents a comfortable place to live in	-	-	-	-	37	37
- Many are going to be destructed/destroyed	24	7	-	-	-	31
- Will cause housing problem	-	-	13	-	13	26
- Improve due to some business	10	12	-	-	-	22
- Increased standard of living	6	3	-	-	-	9
- No comment	-	3	18	7	21	49
- No answer	12	8	7	4	-	31
TOTAL =	100	75	100	75	100	450
6.4 *Education*						
- Noise pollution esp. students will be disturbed	35	23	18	25	34	135
- Increase No. of Students due to increase in population	33	26	24	12	-	95
- Way of teaching will become standard/improvized	-	5	20	6	39	70
- Good and quality education decreases due to the noise	10	1	10	7	15	43
- Technological aspects will be experienced / learn modern aspects	14	8	11	-	-	33
- More schools will be established	-	-	-	15	-	15
- Lack of facilities because of increasing students population	-	-	-	-	12	12
- No comment	-	2	12	10	-	24
- No answer	8	10	5	-	-	23
TOTAL =	100	75	100	75	100	450
7. Historical Value						
- May be forgotten / lost	2	2	44	13	15	76
- Still remain	12	13	12	19	12	68
- Will change to worst due to foreign influence	14	2	6	26	15	63
- Become popular / known	15	9	12	-	22	58

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
- Delicious crops, antique houses will disappear	7	2	6	-	4	19
- More information needed	13	2	-	-	3	18
- Hospitality will be affected	-	1	-	-	-	1
- No comment	19	20	16	15	20	90
- No answer	18	24	4	2	9	57
TOTAL =	100	75	100	75	100	450
. Land Use						
- Owners are to be settled first and paid totally	18	3	50	-	28	99
- From agricultural to industrial land	31	13	-	16	35	95
- Lost hope for the affected people / landless	10	9	-	22	11	52
- Land will be developed / improved	-	16	24	-	-	40
- Will increase in land value	8	-	6	13	8	35
- Crops production will be damaged	4	5	-	7	-	16
- Normal	7	-	-	-	-	7
- No comment	14	10	15	12	10	61
- No answer	8	19	5	5	8	45
TOTAL =	100	75	100	75	100	450
Peace and Order						
- Will be dangerous / risky / critical	5	21	41	-	16	83
- It will become crowded/noisy	30	2	9	23	10	74
- Crime will increase/arise	12	9	-	28	25	74
- Okay if there's a control of peace and order	14	8	9	-	7	38
- Police and securities will be added	-	-	12	-	8	20
- Will maintain if discipline will be implemented	-	-	11	3	5	19
- Will encounter problems	7	5	-	-	5	17
- Many troubles will happen	5	-	-	-	11	16
- No comment	23	8	13	14	7	65
- No answer	4	22	5	7	6	44
TOTAL =	100	75	100	75	100	450

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
10. Others						
- The air we breath will become polluted	-	-	3	-	-	3
- Select good relocation site	2	-	-	-	-	2
- More robbery and thefts	1	-	-	-	-	1
- Will not affect the people	1	-	-	-	-	1
- Maybe this place will become a city. The plan will attain cityhood.	-	1	-	-	-	1
- I hope that the airport will be establish soon for the future of my grandchildren	-	1	-	-	-	1
- No answer	96	73	97	75	100	441
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**
11. What benefits would an airport project provide to you and to your household in particular?						
- Municipal and provincial income will increase	50	30	52	15	43	190
- Increase taxes and tourism	7	14	3	14	34	72
- Job opportunity and income	26	13	5	-	-	44
- There will be more projects that the province can make	-	-	-	5	10	15
- Municipality will emprove	-	-	-	-	13	13
- Employment	8	-	4	-	-	12
- None / no benefits	5	10	27	41	-	83
- No comment	4	1	4	-	-	9
- No answer	-	7	5	-	-	12
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**
2. What benefits would an airport project provide to you and to your household in particular?						
- Job opportunity/employment/can put up small business	42	36	30	12	37	157
- Land value will increase/salary wage will increase	25	-	21	-	32	78
- Additional income if we may employ	4	1	-	4	18	27
- We can already have a better living	-	-	-	20	-	20

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
- Nothing but just demolition	-	7	-	6	-	13
- Easy to go to other countries	4	8	-	-	-	12
- Accessible for tourist / local travellers	2	-	-	-	-	2
- No benefits for us	23	4	43	33	13	116
- No comment	-	7	-	-	-	7
- No answer	-	12	6	-	-	18
TOTAL =	100	75	100	75	100	450
IV. PERCEIVED SOCIAL CHANGES AND PROBLEMS IN THIS COMMUNITY						
1. Whether or not R observed any changes in the environment of the community during the past five years?						
- YES	88	70	99	67	82	406
- NO	12	5	1	8	18	44
TOTAL =	100	75	100	75	100	450
2. If yes, what changes have you observed?						
- Improvement of roads/water system/electric system	9	46	25	19	59	158
- Additional schools, basketball court, health centers, etc.	35	7	15	20	13	90
- Houses improved/increases/provision of housing project/ subdivision	11	8	14	28	10	71
- Beaches were improving/increases and more foreigners migrate here	9	1	16	-	-	26
- Church improvement	-	-	22	-	-	22
- Increase in population	6	2	7	-	-	15
- Salary increases/prices increases/value of land increases	4	2	-	-	-	6

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
- Transportation is fast increasing	3	2	-	-	-	5
- New technology on fishing/less no. of fish colonies	5	-	-	-	-	5
- More problem on financial needs	5	-	-	-	-	5
- Organization was made like purok and cluster system	1	2	-	-	-	3
TOTAL =	88	70	99	67	82	406
3. What do you think are the most pressing prblems of this						
community?						
- Financial problem	47	32	19	17	38	153
- Unemployment	13	20	30	17	17	97
- Lack of water supply/salty water	12	5	31	4	12	64
- Dusty roads/rough roads/unrepaired roads	11	-	-	10	8	29
- Drug addiction	-	-	13	6	-	19
- Population growth	4	-	-	4	4	12
- Poverty	2	4	-	-	6	12
- Transportation	1	-	-	-	6	7
- The proposed airport project	-	4	-	-	-	4
- Low wages / salary	-	-	-	4	-	4
- Illegal fishing	2	-	-	-	-	2
- Street lighting	1	-	-	-	-	1
- No answer	7	6	-	-	-	13
- None	-	4	7	13	9	33
TOTAL =	100	75	100	75	100	450
4. What is being done to solve them?						
- Work hard/plant more crops/engage to sports not drugs	19	3	21	17	3	63
- Giving jobs to those who are jobless	19	8	16	17	-	60
- Ask assistance of the government	5	1	39	6	-	51
- Find enough water soucers/help protecting water resources	13	2	16	4	14	49
- Let this airport project establish as soon as possible for	1	11	-	-	47	59

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
employment and transport means.	4	21	-	-	-	25
- Look for a job	9	-	-	10	2	21
- The government must repair the roads	6	4	-	8	-	18
- Increase salaray rates	13	1	-	-	-	14
- Invite bussineman to put up business here	-	-	-	-	10	10
- Have family planning	1	1	-	-	5	7
- Call a public hearing	-	2	-	-	-	2
- Educate the illiterate	-	1	-	-	-	1
- NA	10	14	8	-	19	51
- Nothing yet	-	6	-	13	-	19
TOTAL =	**100**	**75**	**100**	**75**	**100**	450
5. What would you recommend to solve these problems?						
- Ask assistance to the government/cooperate with the	21	6	20	15	38	100
government/government should find solutions						
- Employ the jobless/give more job openings	14	6	19	-	18	57
- Put up factories and some establishments in our place	9	1	20	7	10	47
- Funding/give loans without interest/capital for business	1	2	30	-	-	33
- Work hard	-	10	-	19	-	29
- Pursue the establishment of the airport and tourism and industry	8	4	-	-	16	28
- Invite foreign and local investors to see if this area is potential	12	15	-	-	-	27
venue for business						
- Salary must increase	4	1	-	-	16	21
- Look for a job	9	1		-	-	10
- Better education for the students/young ones	-	1	9	-	-	10
- Look for more or another water sources	5	3	-	-	-	8
- Stop planning the airport project	-	4	-	-	-	4
- Build the airport only in Panglao	-	2	-	-	-	2
- Illegal fishers should be cought	1	-	-	-	-	1
- NA	16	19	2	34	2	73
TOTAL =	**100**	**75**	**100**	**75**	**100**	**450**

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Timago (N=75)	Bingag (N=100)	Total (450)
6. If you were given a chance to work for the project will you take the opportunity?						
- YES	75	70	96	63	88	392
- NO	12	5	4	6	8	35
- MAYBE	13	-	-	6	4	23
TOTAL =	100	75	100	75	100	450
7. What type of skills do you have that maybe important for possible employment?						
- Janitorial job	7	16	30	11	22	86
- Laborer/metal work	10	8	30	12	23	83
- Any position that can be qualified	12	11	12	5	14	54
- Masonry/plumber/carpentry	9	10	-	17	13	49
- Utility/Maintenance	15	5	14	-	-	34
- Office work/computer job	4	9	-	9	5	27
- Security guard	4	-	-	-	11	15
- Driving	6	3	-	3	-	12
- Furniture and cabinet maker	3	5	-	3	-	11
- Electrical job	2	-	-	3	4	9
- No, I'm already old	9	-	-	-	-	9
- Farming	-	-	-	6	-	6
- Sales clerk/dealer	2	-	-	-	-	2
- Engineering work	1	-	1	-	-	2
- Cooking	-	-	2	-	-	2
- Teaching	-	-	1	-	-	1
- NONE	4	3	6	-	-	13
TOTAL =	88	70	96	69	92	415

CATEGORY OF RESPONSES	Tabalong (N=100)	Mariveles (N=75)	Songcular (N=100)	Tinago (N=75)	Bingag (N=100)	Total (450)
8. Whether R is interested in improving their skills or learning new skills?						
- YES	87	70	96	69	92	414
- NO	13	5	4	6	8	36
TOTAL =	100	75	100	75	100	450
9. Are you willing to contribute your time to participate in possible skills training program?						
- YES	83	70	96	69	80	398
- NO	9	5	4	6	8	32
- MAYBE	8	-	-	-	12	20
TOTAL =	100	75	100	75	100	450
10. Are you aware of any existing organization in this area?						
- YES	89	64	92	66	96	407
- NO	11	11	8	9	4	43
TOTAL =	100	75	100	75	100	450
If YES, what are they?						
- CFC/Religious Organization	25	26	30	31	29	141
- Farmer's Association/Samahang Nayon	8	18	6	9	40	81
- Women's Organization	14	9	28	20	8	79
- Senior Citizen's Association	-	4	14	6	5	29
- Purok Organization	12	6	4	-	-	22
- PTA	8	-	-	-	14	22
- PYM	9	-	10	-	-	19
- Bantay Dagat Association	9	1	-	-	-	10
- Driver's Association	4	-	-	-	-	4
TOTAL =	89	64	92	66	96	407

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
I. PERSONAL DATA						
1. Average Age	51	50	50	50	50	-
	(16-85)	(23-26)	(22-79)	(21-87)	(23-94)	
2. Birthplace						
- Since birth	65	76	77	61	70	349
- Other parts of Bohol	21	14	11	25	15	86
- Central Visayas	6	7	2	5	6	26
- Mindanao Areas	6	2	10	8	8	34
- Luzon Areas	2	1	-	1	1	5
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**
3. Educational Attainment						
- Elementary undergrad	17	5	22	24	25	93
- Elementary graduate	29	1	44	35	33	142
- High School undergrad	5	5	7	15	13	45
- High School graduate	21	5	11	9	6	52
- College undergrad	12	11	5	6	9	43
- College graduate	13	73	11	7	11	115
- Vocational	3	-	-	4	3	10
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**
4. Occupation						
- Professional/technical/government employee	16	48	11	10	13	98
- Salesworker/businessman	11	6	5	5		27
- Farmer/fisherman	46	2	49	53	40	190
- Service (Policeman, security guard, driver, councilor)	9	5	8	10	8	40

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
- Laborer/carpenter/plumber	5	4	20	14	11	54
- Seaman, overseas worker	-	2	1	2	2	7
- None/housekeeper/pensioner/retired	13	33	6	6	26	84
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**
5. Household Size Average	5	5	6	6	6	-
6. Main Source of Income						
- Salary	25	67	48	22	16	178
- Income derived from business (farming/fishing)	52	8	44	57	63	224
- Income derived from services	17	13	6	13	8	57
- Pension, children support	6	12	2	8	13	41
- Allotment/remittance	-	-	-	-	-	-
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**
II. MIGRATION						
1. Where did you previously live?						
- Since birth	68	76	81	70	82	377
- Other parts of Bohol (Albur, Tawala, Inabanga, Libaong, Dauis, Calape, etc.)	16	13	10	14	3	56
- Mindanao Areas (Davao, Surigao, Misamis Occ., Iligan, Zamboanga)	6	3	7	11	8	35
- Central Visayas Area (Cebu, Siquijor, Samar)	7	6	1	2	6	22
- Manila, Others	3	2	1	3	1	10
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
2. **Reasons for moving in the area**						
- Family livers here/have many relatives here/husband is from here	3	5	-	12	16	36
- Residence by affinity/bonafide residence	20	1	-	10	-	31
- Got married here	-	6	10	8	-	24
- For business purposes/employment/job is here/greener pasture	1	4	9	-	-	14
- Obtained residence	8	2	-	-	-	10
- Peaceful place/fresh air and clean place	-	4	-	-	-	6
- To study in college	-	1	-	-	-	1
- Bought land here	-	1	-	-	2	1
TOTAL =	**32**	**24**	**19**	**30**	**18**	**123**
3. **Whether stay or move somewhere if given a chance/and reasons.**						
- Stay	97	99	100	99	100	495
- Move	3	1	-	1	-	5
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**
NA						
* Reasons						
- Peaceful place/nice place/I love this place	12	47	4	47	59	169
- Farm is here/property is here/business is here	45	20	1	42	-	108
- Adjusted to stay here	-	-	55	-	-	55
- This is my birthplace/native land	17	10	12	-	12	51
- Obtained residence	4	10	28	-	8	50
- My family is here/job is here	15	8	-	11	14	48
- Tired staying in the city	2	2	-	-	-	4
- To search for greater job	2	2	-	-	-	4
- Too old to move somewhere	3	1	-	-	-	4
- NA	-	-	-	-	7	7
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
III. SOCIAL AWARENESS						
1. Whether or not aware of the proposed airport project.						
- Yes	97	100	13	90	96	396
- No	3	-	87	10	4	104
TOTAL =	100	100	100	100	100	500
R's source of informationa						
- Neighborhood	53	44	3	42	80	222
- Local Officials	23	36	2	36	6	103
- Media	21	20	8	12	10	71
- Others	-	-	-	-	-	-
TOTAL =	97	100	13	90	96	396
2. Whether or not in favor of the airport plan.						
- Yes	73	97	22	92	91	375
- No	27	3	78	8	9	125
TOTAL =	100	100	100	100	100	500
R's reasons for "No" answers						
- Can affect our living/our house and lot will be affected	5	-	47	-	3	55
- Reduces land for agricultural purposes/farming is our priority	3	3	14	-	3	23
- Noise pollution/disturbance	8	-	-	3	2	13
- No proper relocation to the affected families/we don't want demolition	-	-	9	-	-	9
- We're already stable here/our livelihood is here	-	-	8	-	-	8

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
2. **Reasons for moving in the area**						
- Family livers here/have many relatives here/husband is from here	3	5	-	12	16	36
- Residence by affinity/bonafide residence	20	1	-	10	-	31
- Got married here	-	6	10	8	-	24
- For business purposes/employment/job is here/greener pasture	1	4	9	-	-	14
- Obtained residence	8	2	-	-	-	10
- Peaceful place/fresh air and clean place	-	4	-	-	-	6
- To study in college	-	1	-	-	-	1
- Bought land here	-	1	-	-	2	1
TOTAL =	**32**	**24**	**19**	**30**	**18**	**123**
3. **Whether stay or move somewhere if given a chance/and reasons.**						
- Stay	97	99	100	99	100	495
- Move	3	1	-	1	-	5
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**
NA						
* Reasons						
- Peaceful place/nice place/I love this place	12	47	4	47	59	169
- Farm is here/property is here/business is here	45	20	1	42	-	108
- Adjusted to stay here	-	-	55	-	-	55
- This is my birthplace/native land	17	10	12	-	12	51
- Obtained residence	4	10	28	-	8	50
- My family is here/job is here	15	8	-	11	14	48
- Tired staying in the city	2	2	-	-	-	4
- To search for greater job	2	2	-	-	-	4
- Too old to move somewhere	3	1	-	-	-	4
- NA	-	-	-	-	7	7
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
III. SOCIAL AWARENESS						
1. Whether or not aware of the proposed airport project.						
- Yes	97	100	13	90	96	396
- No	3	-	87	10	4	104
TOTAL =	100	100	100	100	100	500
R's source of informationa						
- Neighborhood	53	44	3	42	80	222
- Local Officials	23	36	2	36	6	103
- Media	21	20	8	12	10	71
- Others	-	-	-	-	-	-
TOTAL =	97	100	13	90	96	396
2. Whether or not in favor of the airport plan.						
- Yes	73	97	22	92	91	375
- No	27	3	78	8	9	125
TOTAL =	100	100	100	100	100	500
R's reasons for "No" answers						
- Can affect our living/our house and lot will be affected	5	-	47	-	3	55
- Reduces land for agricultural purposes/farming is our priority	3	3	14	-	3	23
- Noise pollution/disturbance	8	-	-	3	2	13
- No proper relocation to the affected families/we don't want demolition	-	-	9	-	-	9
- We're already stable here/our livelihood is here	-	-	8	-	-	8

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
- Can cause disorder to our peaceful island/transportation accidents	2	-	-	-	1	3
- NA	9	-	-	5	-	14
TOTAL =	27	3	78	8	9	125
3. **R's opinion on what things should be taken into account before the plan is finalized?**						
- Perception of the said project/pros & cons of the project/ study should be conducted first .	22	25	-	20	56	123
- Relocation area for the affected/stability of their livelihood	25	26	25	11	-	87
- Information drive to the people/security and safety to the people	37	26	4	10	-	77
- Pay all the benefits to the land owners/should have enough budget/negotiate with land owners	-	10	26	7	-	43
- We don't want to continue the project because we will lost our livelihood	-	-	40	-	-	40
- The project should be finalized soon/none	-	-	-	-	24	24
- Surveying of lands/non disturbance of natural resources	15	2	-	-	-	17
- Support the said airport plan/people should cooperate accomplish the plan	-	-	-	-	12	12
- Coordinate with the local officials/barangay assembly/forum	-	2	5	-	-	7
- Roads in Panglao should be cemented first/repair of roads (Dauis)	-	4	-	-	-	4
- Employment to the people	-	1	-	-	-	1
- NA	1	4	-	52	8	65
TOTAL =	100	100	100	100	100	500

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
Effects of putting up an airport in terms of:						
4. Economy						
4.1 *Livelihood:*						
- Livelihood will improve and fully develop	55	40	-	18	-	113
- Introducing livelihood programs to the people/create job opening/	20	17	-	17	59	113
increase livelihood projects						
- High standard of living	14	18	-	46	11	89
- Stop this project so that our livelihood will not be affected	-	-	31	-	30	61
- Agricultural livelihood will lessen/cannot plant crops anymore/	-	7	47	-	-	54
decrease livelihood projects						
- More sources of income/job opportunities	-	15	10	10	-	35
- Little progress/normal life of residents will not be affected	11	3	-	-	-	14
- Many people will suffer/gap between rich and poor	-	-	12	-	-	12
- NA	-	-	-	9	-	9
- Noise disturbance	-	-	-	-	-	-
- Only educated people can benefit	-	-	-	-	-	-
- It gives benefits to people	-	-	-	-	-	-
- No comment	-	-	-	-	-	-
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**
4.2 *Employment:*						
- Increase in employment rate/many people can have job/more jobs	47	49	45	50	26	217
- Unemployment problem will be solved/job opportunities	25	27	-	-	62	114
- Employment within the locality must prioritized/business	15	24	-	22	-	61
opportunities						
- First priority to work is the land owners	-	-	32	-	-	32
- High attainments only can be accepted for employment	-	-	7	13	-	20

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
- Give permanent job to those who are affected	-	-	16	-	-	16
- Depends on the educational attainment	-	-	-	15	-	15
- None	13	-	-	-	-	13
- No comment	-	-	-	-	12	12
- Normal	-	-	-	-	-	-
- Unemployment	-	-	-	-	-	-
TOTAL =	100	100	100	100	100	500
4.3 *Trade and Industry*						
- Tourism will increase/many will invest here	26	22	55	22	21	146
- Production of crops will increase	28	16	-	37	36	117
- Low production of crops/decrease crop production	34	16	22	33	-	105
- Business sectors will increase/business sector will improve	6	26	-	-	24	56
- Big industries/establishment will open	6	20	-	-	-	26
- Panglao will become a center of tourism in Bohol	-	-	-	-	19	19
- High price of products/revenues/supply/demand	-	-	18	-	-	18
- None	-	-	5	8	-	13
- No comment	-	-	-	-	-	
- Promotes our products/easy to export products/natural resources	-	-	-	-	-	
TOTAL =	100	100	100	92	100	500
5. Migration						
- More and different kind of people will live here/increase number of migrants/easy to migrate	40	49	-	33	14	136
- Will become over populated/over crowded	44	42	17	-	-	103
- Easier to migrate to other countries	16	2	34	-	29	81
- Dislocation of affected families	-	-	16	-	23	39

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
- More people will invest here/attract investors	-	7	-	26	-	33
- Troublesome affected families	-	-	33	-	-	33
- Illegal transactions will enter here/prostitution may increase	-	-	-	-	17	17
No comment	-	-	-	14	-	14
- No answer	-	-	-	27	17	44
- Increase number of vehicles/standard of living will increase	-	-	-	-	-	-
- Normal	-	-	-	-	-	-
TOTAL =	100	100	100	100	100	500
6. **Community Facilities, Services or Institution**						
6.1 *Transportation:*						
- Vehicle operation cost will increase/fare increase	43	33	-	18	34	128
- Improve and will be easy to travel/fast and convinient to travel	-	27	32	13	43	115
- Increase in number of vehicles	6	30	9	42	17	104
- Traffic problems/noise due to vehicle/air pollution	24	4	35	16	-	79
- Modern buses and jeepneys will increase	27	3	8	-	-	38
- Many road accidents will happen	-	3	16	11	6	36
- No comment	-	-	-	-	-	-
- Normal	-	-	-	-	-	-
- Frequency of travel will	-	-	-	-	-	-
- Increase in accidents	-	-	-	-	-	-
- Increase in opportunities for drivers to improve their life	-	-	-	-	-	-
TOTAL =	100	100	100	100	100	500
.2 *Health and Sanitation:*						
- No proper garbage disposal/proper nutrition	23	-	25	25	56	129
- Dirty water supply/contamination of water	31	-	21	26	-	78

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
- Air and water pollution weer rampant/polluted environment	-	57	9	-	-	66
- Increase volume of garbage	-	-	37	40	-	77
- Proper dumping site must impose/more drainage	25	6	3	-	19	53
- Must have additional water supply/garbage trucks	-	28	-	-	-	28
- Improvement of water supply/water system	21	6	-	9	11	47
- Salty water	-	-	-	-	-	-
- More medical supplies	-	-	-	-	14	14
- Depends on the management of the sanitary inspector/not sure	-	3	5	-	-	8
of effects/government resposibility						
- No comment	-	-	-	-	-	-
- Normal/still clean and healthy environment	-	-	-	-	-	-
- No answer	-	-	-	-	-	-
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**
6.3 *Housing*						
- Many buildings/houses will be constructed	52	24	9	35	72	192
- House improvement/concrete houses	-	15	-	36	24	75
- Housing projects/subdivisions will be constructed/decrease	48	7	-	15	4	74
- Proper relocation of affected houses	-	14	53	14	-	81
- Congestion in houses and buildings/over crowding/increase	-	16	17	-	-	
in number of housing problems						33
- Increase in number of houses	-	24	-	-	-	24
- There should have an assessed value for the damage houses/	-	-	21	-	-	21
some houses will be affected						
- Normal	-	-	-	-	-	-
No comment	-	-	-	-	-	-
No answer	-	-	-	-	-	-
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
6.4 *Education*						
- Increase in number of students	22	33	12	60	28	155
- Additional rooms and school buildings	44	13	16	5	64	142
- Students cannot concentrate well/disturbance	13	1	65	30	8	117
- Education will be given importance	-	20	-	-	-	20
- Private schools will be build here	17	-	-	-	-	17
- Construction of colleges	-	13	-	-	-	13
- Standard and quality education/advantageous to students	4	8	-	-	-	12
- Tourism courses will be offered	-	12	-	-	-	12
- NA	-	-	7	5	-	12
- No comment	-	-	-	-	-	-
- Normal	-	-	-	-	-	-
TOTAL =	100	100	100	100	100	500
6.5 *Sports and Recreation*						
- There will be more sports and recreation centers/increase recreations	36	53	12	29	51	181
- Many will engage to sports/good site for jogging every morning/	6	25	53	31	17	132
better place for pleasure	33	2	-	13	32	80
- New facilities will be given/bad effect because of air pollution	-	18	21	27	-	66
- Will improve/developed	25	-	-	-	-	25
- No comment	-	2	14	-	-	16
- NA	-	-	-	-	-	-
- Players will be disturbed it is near the airport/Normal not affected	-	-	-	-	-	-
- Affected by noise/will be affected	-	-	-	-	-	-
- Normal/no effect	-	-	-	-	-	-
TOTAL =	100	100	100	100	100	500

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
7. **Historical Value**						
- Will change to foreign values	28	33	46	18	39	164
- Will disappear/lost/fade out	37	42	-	52	-	131
- Will still be preserved/remain	33	-	26	16	-	75
- Will change/people will be socialized	2	12	-	-	49	63
- Will be forgotten	-	11	-	-	12	23
- Attraction to tourist	-	-	-	14	-	14
- Depends on the individual behaviour	-	-	13	-	-	13
- No comment	-	2	-	-	-	2
- NA	-	-	15	-	-	15
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**
8. **Land Use**						
- Agricultural land will be change to industrial and commercial land/ decreased agricultural land	42	33	48	45	48	216
- Agricultural land will be no more/lost of property	26	-	-	-	28	54
- Limit for projects	-	28	20	-	-	48
- Crowded with business establishments/little vacant space	-	19	-	28	-	47
- Paying right the afected land owners	19	-	24	-	-	43
- There should have a small area for faming	-	-	-	-	24	24
- Many cottages and beach resort will be constructed	-	18	-	-	-	18
- No comment	13	2	-	-	-	15
- NA	-	-	8	27	-	35
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**
9. **Peace and Order**						
- Increase in crimes/crime rate	24	29	56	42	14	165
- Our area will become disorder/critical/crowded and noisy	12	30	44	12	16	114

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
- Unstable security and peace problems	-	-	-	27	70	97
- Rules and ordinance will be implemented/peace and order will improve	28	31	-	19	-	78
- Peaceful if still controlled by the government	-	10	-	-	-	10
- No comment	36	-	-	-	-	36
- No answer	-	-	-	-	-	-
- Normal	-	-	-	-	-	-
TOTAL =	100	100	100	100	100	500
10. What benefits would an airport project provide to the people in the municipality and in the province?						
- More income of the municipality/province/government	45	19	31	22	62	179
- Employment job	-	50	50	-	24	124
- Economic development/progress/development of the province	25	16	-	68	-	109
- Attract investors to invest here	30	15	-	-	-	45
- Increase income taxes	-	-	19	-	-	19
- Salary increase to the employees	-	-	-	10	-	10
- None/no benefits	-	-	-	-	14	14
- Improve transportation facilities	-	-	-	-	-	-
- Tourism	-	-	-	-	-	-
- No comment	-	-	-	-	-	-
- No answer	-	-	-	-	-	-
TOTAL =	100	100	100	100	100	500
11. What benefits would an airport project provide to you and to your household in particular?						
- Possible employment/job opportunities	9	3	76	17	47	152
- Improve our source of income/additional income	-	30	24	44	-	98

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
- Will solve our unemployment problem	34	-	-	-	17	51
- Opportunities for advancement in life	6	17	-	23	-	46
- A big chance for my business	-	36	-	-	-	36
- Improvement in travelling time/easy and convenient travel/ better transportation facilities	33	-	-	-	-	33
- No benefits/None	18	14	-	16	36	84
- No comment/no answer	-	-	-	-	-	-
- Increase in land value	-	-	-	-	-	-
- Just demolition	-	-	-	-	-	-
TOTAL =	100	100	100	100	100	500
IV. PERCEIVED SOCIAL CHANGES AND PROBLEMS IN THIS COMMUNITY						
1. Whether or not R observed any changes in the environment of the community during the past five years?						
- YES	100	100	100	100	100	500
- NO	-	-	-	-	-	-
TOTAL =	100	100	100	100	100	500
2. If yes, what changes have you observed?						
- Roads are already cemented/asphalted/improved road	47	59	22	26	47	201
- Good electricity/water supply/communication system	-	12	38	30	-	80
- Most of the beaches are developed	34	8	-	10	10	62
Increase in population/peace and order/pollution	15	-	-	18	3	36
- New buildings were built/schools/health centers, etc./churches houses	-	-	20	11	-	31
- People are already socialized	4	-	11	-	-	15

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
- Few people engaged in farming/increase land value	-	13	-	-	-	13
- More tourist/tourist sports improvement	-	8	3	-	-	11
- High price of commodities/new technology/development	-	-	6	-	-	6
of business	-	-	-	-	-	-
- Transportation/increase	-	-	-	-	-	-
- None	-	-	-	-	-	-
- Organizations was made like purok and cluster system	-	-	-	-	-	-
- Destruction of facilities	-	-	-	-	-	-
TOTAL =	100	100	100	95	60	455
3. What do you think are the most pressing problems of this community?						
- Unemployment	35	40	-	53	18	146
- Livelihood	-	-	74	19	-	93
- Drug addiction	9	11	-	17	55	92
- High price of commodities/low wage/economic crisis	-	11	-	11	18	40
- Poverty	16	18	-	-	-	34
- Low income	28	2	-	-	-	30
- Illegal gambling/dynamite fishing	12	3	-	-	9	24
- Water supply is not sufficient/salty	-	15	7	-	-	22
- Garbage/pollution	-	-	15	-	-	15
- Fiancial	-	-	4	-	-	4
- Population growth	-	-	-	-	-	-
- Transportation	-	-	-	-	-	-
- Proposed project itself	-	-	-	-	-	-
- NA	-	-	-	-	-	-

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
- None	-	-	-	-	-	-
- Street lighting	-	-	-	-	-	-
- Others	-	-	-	-	-	-
TOTAL =	100	100	100	100	100	500
4. What is being done to solve them?						
- Reporting immediately to the authority/jail the pushers/	32	-	-	-	55	87
rehabilitation						
- Employment especially in this airport project	-	25	-	29	18	72
- Look for permanent job with high salary	-	-	52	-	18	70
- Ask assistance and support from the government/constant	-	22	35	-	-	57
monitoring of						
- Awareness seminar/educate the /public hearing	19	36	-	-	-	55
- Finalized this project	-	11	9	40	-	60
- Coordination with the police force and people in the community	-	3	-	16	9	28
- Presence of tanods for each barangay	24	-	4	-	-	28
- No answer/nothing yet/none	25	3	-	15	-	43
- Invite investments/increase salary rates	-	-	-	-	-	-
- Family planning/help protect water sources/help one another	-	-	-	-	-	-
TOTAL =	100	100	100	100	100	500
5. What would you recommend to solve these problems?						
- Cooperate to continue this airport project for employment	-	49	32	9	7	97
business opportunities						
- Need employment for the people	23	-	35	-	37	95
- Provide free college education and livelihood projects	-	23	13	58	-	94
- Need more establishments/work hard	6	-	-	-	45	51
- Night patrol/diligent duty of barangay tanod	18	13	7	-	-	38

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
- Capture and put to jail who commits a crime	17	4	-	-	11	32
- Ask government assistance/government should find solution	-	-	-	24	-	24
- Community awareness about drug addiction/drug watch	21	1	-	-	-	22
- Law enforcers must be alert/illegal fishing should be caught	15	-	-	-	-	15
- Check points should be done	-	-	13	-	-	13
- Invite investors/increase salary/business opportunities/ look for job	-	10	-	9	-	19
- No answers	-	-	-	-	-	-
- Stop planning the airport/build airport only in Panglao	-	-	-	-	-	-
- Look for more water sources	-	-	-	-	-	-
- Loan without interest	-	-	-	-	-	-
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**
6. If you were given a chance to work for the project will you take the opportunity?						
- YES	59	62	64	47	63	295
- NO	11	11	3	18	13	56
- MAYBE	30	27	33	35	24	149
TOTAL =	**100**	**100**	**100**	**100**	**100**	**500**
7. What type of skills do you have that maybe important for possible employment?						
- Laborer	37	3	31	50	24	145
- Carpentry/masonry	17	-	28	3	27	75
- Office works/clerical/computer works	7	39	7	10	3	66
- Janitorial/utility worker, maintenance	-	-	19	-	28	47
- Any kind of job	-	19	-	14	-	33
- Technical skills (engineer, nurse)	-	13	6	2	5	26

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
- Service skills (cooking, driving, waiter, laundry)	10	5	6	3	-	24
- Building construction	9	-	-	-	-	9
- Teaching	-	8	-	-	-	8
- Plumber/electrician	6	1	-	-	-	7
- Basket making/furniture making	3	1	-	-	-	4
- Farming	-	-	-	-	-	-
- None	-	-	-	-	-	-
- I'm so old	-	-	-	-	-	-
- Security guard	-	-	-	-	-	-
- Others	-	-	-	-	-	-
TOTAL =	89	89	97	82	87	444
8. Whether R is interested in improving their skills or learning new skills?						
- YES	88	89	97	83	87	444
- NO	12	11	3	17	13	56
TOTAL =	100	100	100	100	100	500
9. Are you willing to contribute your time to participate in possible skills training program?						
- YES	45	70	70	35	20	240
- NO	11	11	3	12	27	64
- MAYBE	44	19	27	53	53	196
TOTAL =	100	100	100	100	100	500

SOCIO-ECONOMIC SURVEY RESULTS
Municipality of Panglao
(May 2000)

CATEGORY OF RESPONSES	Lourdes (N=100)	Poblacion (N=100)	Tawala (N=100)	Bolod (N=100)	Danao (N=100)	Total (500)
10. Are you aware of any existing organization in this area?						
- YES	87	75	86	95	7	350
- NO	13	25	14	5	93	150
TOTAL =	100	100	100	100	100	500
If YES, what are they?						
- Religious Organization	17	16	24	37	7	101
- Farmer's Association/Bantay-Dagat	14	24	46	17	-	101
- Women's Organization	20	14	16	16	-	66
- Senior Citizen's Association	5	8	-	13	-	26
- Cooperatives	20	5	-	-	-	25
- School Organization (PTA)	5	-	-	12	-	17
- NGO's	-	8	-	-	-	8
- BHW	6	-	-	-	-	6
- PYM	-		-	-	-	-
Driver's Association	-		-	-	-	-
Purok Organization	-		-	-	-	-
Business Organization	-		-	-	-	-
Civil Organization/Rotary	-		-	-	-	-
A lot of organization	-		-	-	-	-
Youth organization	-		-	-	-	-
TOTAL =	87	75	86	95	7	350

This page - Immediately after the Annex B.1

PERCEPTION SURVEY RESULTS
(Panglao) Landowners

➢ SOCIAL AWARENESS

One of the things to be taken before the plan is finalized was to consult first the landowners and know the effects and disadvantages of the project to the people as well as to the community.

More vehicles and more migrants were the major effects of the project to the community. About 78% of the landowners were aware of the project. About 27% said that their community will be improved in the way that their livelihood will increase and more job opportunities will be given to the people, that is why almost 51% of the landowners or half of them were willing to sell their lots.

➢ REMARKS

1. The government should pay the affected residents with a reasonable amount.
2. Affected landowners must be given a proper relocation site.
3. Do not have other source of income.
4. Continue the project as soon as possible/ it would be good for the community.
5. We love this place/we don't want to be relocated.
6. We are not in favor of this proposed plan.

LAND OWNERS SURVEY RESULTS

II. SOCIAL AWARENESS

1. Are you aware of the proposed airport project in your area?

Yes	-	63 / 78%
No	-	18 / 22%

2. Are you in favor of this plan?

Yes	-	37 / 46%
No	-	44 / 54%

If no, why?

- more residents will be affected/more pollution – 34 / 17%
- the land has a sentimental value on us - 3 / 7%
- no proper relocation - 5 / 11%
- NA - 2 / 5%

3. In your opinion, what things should be taken into account before the plan is finalized?

- consult the landowners first/welfare of the residents - 34 / 42%
- effects/disadvantages of this project to the people/community - 27 / 33%
- provide a relocation site for the affected landowners - 5 / 6%
- pay the affected residents first - 3 / 4%
- no comment - 12 / 15%

4. What do you think will be the effect of this project on your community and in your household as well?

- improvement/increase of livelihood/more job opportunities - 22 / 27%
- pollution/more vehicles/more immigrants - 32 / 40%
- disturbance to the landowners/drug addiction/crimes - 20 / 25%
- no more source of income - 6 / 7%
- NA - 1 / 1%

5. If it happens that your land ownership will be covered by the proposed airport site, are you willing to sell the lot?

Yes	-	41 / 51%
No	-	39 / 48%
NA	-	1 / 1%

If no, why?

- no relocation site yet - 19 / 49%
- no more source of income - 10 / 26%
- we are not in favor to be relocated - 6 / 15%
- it depends/consult the landowners first - 4 / 10%

REMARKS:

- the government should pay the affected residents with a reasonable amount;

  20 / 25%

- affected landowners must be given a proper relocation site;

  17 / 21%

- continue the project as soon as possible/it would be good for the community;

  11 / 14%

- we love this place/we don't want to be relocated;

  9 / 11%

- we are not in favor of this proposed plan;

  6 / 7%

- we don't have other source of income;

  13 / 16%

- only the rich will be benefited;

  3 / 4%

- if there is really a need for this project,we don't have a choice, but to sell out lot';

  2 / 2%

For Land Owners – Last interview conducted, August 26 – September1, 2000 (For 81 Landowners)

Results:

In Favor	= 46%
Not In Favor	= 54%

➢ *Recommendations:*

In order that this project will have strong proof of social acceptability, the following are recommended for the study:

1. It is highly recommended that several barangay assemblies and sectoral meetings be held in order to meet with the various stakeholders of the project. Technical scoping session should be conducted together with the Environmental Team and the EMB or a step by step community scoping process is very essential. In addition, further socio-economic community scoping process is very essential. Also, further socio-economic and perception surveys be conducted for the study in order to draw conclusions that are more representative.

2. Any adverse reactions should be replaced by positive attitudes towards the project by emphasizing the provision of employment or income opportunities that will be posed by the project.

3. In order that the beneficiaries will become strong and active partners of the local government unit and line agencies in implementing development projects, it is recommended that social preparation component be extended to a longer period. The interplay of the project and the people requires careful monitoring to make the project scheme as closely compatible with and responsive to the needs and sentiments of those who greatly is affected by the project.