

**6. CONSTRUCTION PROGRAM**

**6-1 Implimentation**

**6-2 Construction and Supervision**

**6-3 Scope of Work**

**6-4 Construction Schedule**

**6-5 Procurement**



## CHAPTER 6 CONSTRUCTION PROGRAM

### 6-1 Implimentation

After exchange of the instrument of agreement (Exchange of Notes = E/N) between the Japanese and Bolivian Governments concerning the construction of the proposed hospital, a contract concerning the implementation design and supervision is to be concluded between a Japanese consulting firm and the Bolivian Government before starting to implement design work.

After preparing the drawings, specifications, medical equipment specifications and documents necessary for a tender contract, tenders will be invited from constructors, subject to Bolivian approval of the contents of the implementation design documents.

Construction will start after a contract has been concluded between the successful bidder and the Bolivian Government, subject to verification of the contract by the Japanese Government.

The Bolivian Government is to ensure that necessary preparations, such as ground preparation, are completed in time so that the start of construction will not be delayed.

### 6-2 Construction and Supervision

As the constructor will be of Japanese nationality, the firm should have sufficient experience or have conducted adequate preliminary surveys in Bolivia. The key to successful construction lies in cooperation with appropriate local constructors. It will therefore be necessary to organize a system for smooth management by allocating work to the constructor and local constructors and by deploying manpower accordingly.

As for supervision, from the design stage on, the Japanese consultants are to maintain close communication with the Bolivian Ministry of Health, Santa Cruz municipal authorities and other authorities concerned. At the supervisory level, experienced experts will be stationed for consultation, alterations and other clerical work with the Ministry of

Health and municipal authorities of Santa Cruz. They are also to conduct quality control and schedule supervision. Engineers will be sent out regularly to provide sufficient assistance.

### 6-3 Scope of Work

In constructing the proposed hospital, the Bolivian side is to prepare or carry out the following work.

1. Acquisition of land.
2. Felling of trees on the site where necessary.
3. Preparation of land and banking procedures.
4. Preparation of an approach road to the site and paving work.
5. Installation of temporary electric power and water supply and telephone required during construction.
6. Preparation of drain routes for sewage and rainwater from the site.
7. Power supply work up to the receiving and transforming unit.
8. Water main supply work to the site area.
9. Gas main supply work to the site area.
10. Telephone line supply work up to the MDF unit in the building.
11. Construction of fencing and gates around the site.
12. Tax exemption and customs clearance with regard to the importation of equipment and materials.
13. Procurement of fixture, equipment and furniture.

Various legal formalities required under the Bolivian law are to be completed by the Bolivian side.

### 6-4 Construction Schedule

The construction of the proposed hospital is expected to take about 27 months to complete. The construction of a similar hospital of the same scale normally takes 12-14 months to complete in Japan. The longer period required for the construction of this proposed hospital is due to the factors outlined below.

- 1) Foundation work will take longer because of the soft ground, which requires piling.
- 2) Cement, a basic construction material, is not produced locally and must be transported from other cities. Moreover, the transportation is often restricted during the rainy season.
- 3) It may be difficult to secure the highly skilled labor necessary.
- 4) Construction work will often be interrupted by heavy rains during the rainy season.
- 5) The volume of concrete that can be formed per day is limited.
- 6) In brick laying, a sufficient period for drying and nurturing is required before plastering, in order to obtain good results after completion.
- 7) Medical equipment should be installed and adjusted after all finishing work has been completed.

construction may occur often, coupled with general strikes.

Accordingly, it will be necessary to formulate a work schedule taking into consideration the above points in constructing the proposed hospital.

The work schedule for this project is shown below.

## 6-5 Procurement

### (1) Materials

As a rule, construction materials are to be procured locally. Of the basic construction materials, cement is not produced locally and has to be procured either in Sucre or Cochabamba. Attention should be paid to its transportation.

Some steel frames and finishing materials, not available locally in the required quality, are to be imported either from Japan or a third country. Apart from Japan, procurement of materials in Brazil, which borders on Bolivia, should be considered.

### (2) Medical Equipment

As most of the medical equipment is not produced in Bolivia,

Work Schedule

Note: The number of the month is counted from the month of the conclusion of E/N

Number of the month	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	...	31	32	33	34	
Government of Bolivia																																				
Government of Japan																																				
Consultant																																				
Contractor																																				
Remarks																																				

it is largely to be imported from Japan.

(3) Labor force

As Santa Cruz is Bolivia's second largest city, with a population of 330,000, it is unlikely that there will be a large shortage of labor. Though there is some concern for the procurement of highly skilled labor, it is possible to obtain such labor from highland cities such as La Paz and Cochabamba.





**7. ADMINISTRATION AND MANAGEMENT**

**7-1 Administration System**

**7-2 Operating Budget**

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## CHAPTER 7 ADMINISTRATION AND MANAGEMENT

### 7-1 Administration System

#### (1) Management and Operation System

The director of the existing national hospital is appointed by the Assistant Secretary of the Ministry of Health and most control and management costs are defrayed from the budget of the Ministry, thus being strongly influenced by central government policy.

The new government has established as urgent the advancement of welfare and medical care based on the rehabilitation of the national economy.

However, under the current stagnant economic conditions, the budget of the Ministry of Health has been drastically cut. It must be concluded, therefore, that it will be difficult for the Ministry of Health to financially manage the proposed hospital.

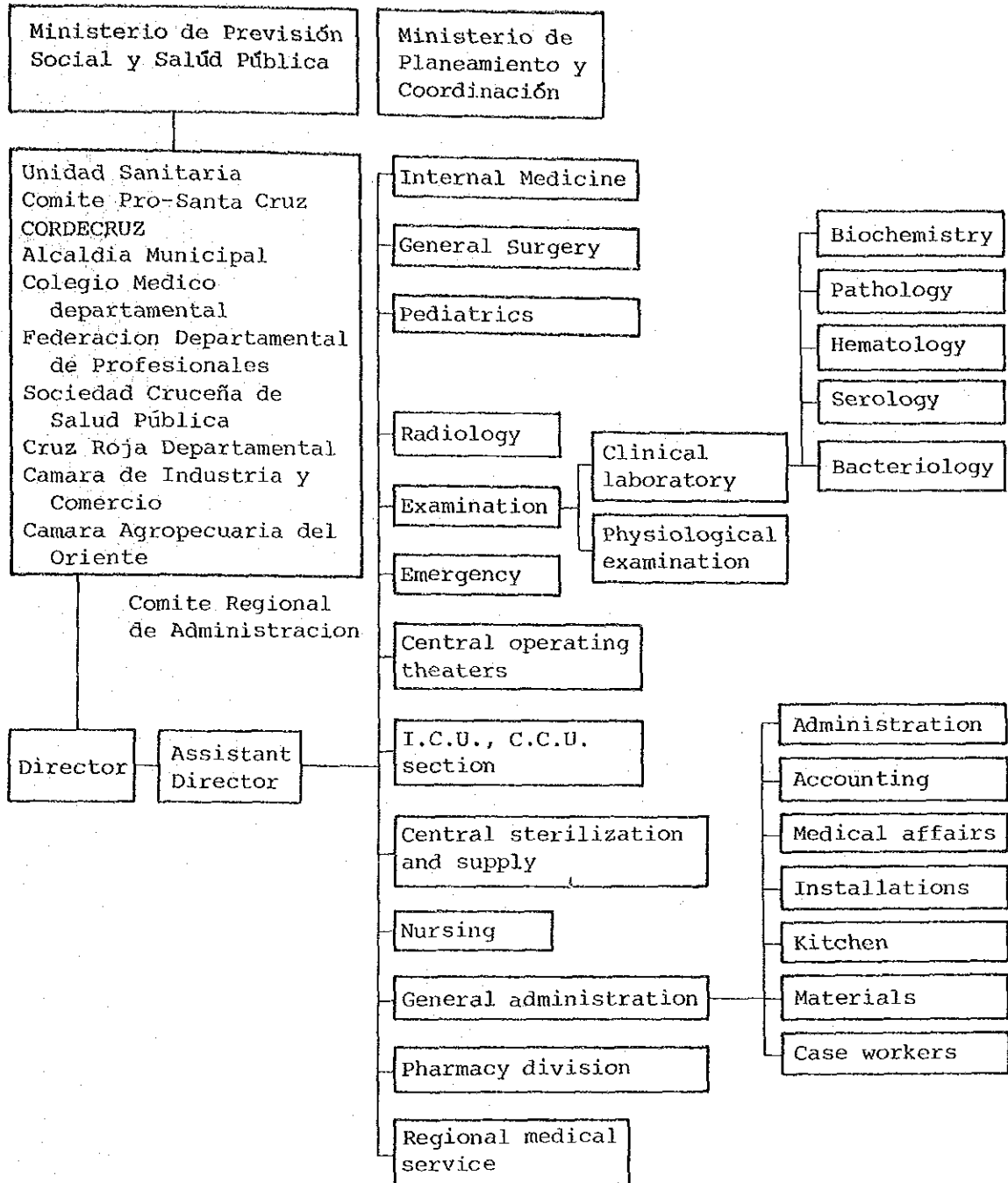
Through a series of consultations with the Ministry of Health and State officials concerned, the survey team was assured that "the proposed hospital will be administered and managed by a committee consisting of the agencies concerned in Santa Cruz under the supervision of the Ministry of Health."

#### (2) Personnel Deployment Plan

The following is a provisional list of the personnel required to manage and operate the hospital adequately. However, a revision will be undertaken when the new administrative organization of the Bolivian Ministry of Health is completed.

Class	Content	Number of staff	Total
Special doctors	Director, Assistant Director	2	50
	Pathology	2	
	Physiology	1	
	Radiology	1	
	Anesthesia	1	
	Internal Medicine	10	
	General Surgery	10	
	Pediatrics	8	
Wards	15	50	
Doctors holding dual positions		10	10
Nurses	Regular nurses	30	120
	Assistant nurses	50	
	Nursing aides	40	
Technicians	X-ray technicians	2	7
	General technicians	4	
	Pathology technicians	1	
Technical assistants	X-ray technical assistants	4	14
	General technical assistants	8	
	Pathology technical assistants	2	
Administration, Financial Affairs			35
Kitchen			20
Laundry			12
Security			10
Guards			8
Cleaners and miscellaneous workers			15
Total			301

(3) Organization Chart



## 7-2 Operating Budget

The UNIDAD SANITARIA DE SANTA CRUZ gives the following estimated annual operating budget for this hospital, based on experience.

1. Personnel expenses	<u>\$b. 156,774,600</u>
2. Business expenses	<u>\$b. 45,017,996</u>
2-1 Telephone, postal, telegraph and other communication	11,565,468
2-2 Electricity and water	30,442,080
2-3 Public Relations (newspaper, radio, TV, etc.)	1,900,000
2-4 Publication and printing	1,110,448
3. Maintenance and repairs	<u>\$b. 38,577,484</u>
3-1 Building repairs (interior and exterior)	5,500,000
3-2 Repair of medical equipment	10,209,300
3-3 Repair of facility equipment	12,104,650
3-4 Repair of office equipment	4,500,000
3-5 Repair of conveyor equipment (elevators etc.)	3,763,534
3-6 Other repairs	2,500,000
4. Materials and supplies expenses	<u>\$b. 190,205,216</u>
4-1 Paper, stationery and other supplies	4,926,360
4-2 Cleaning supplies	18,741,600
4-3 Clothes, fabrics, etc.	20,541,648
4-4 Foods	45,895,024
4-5 Lubricants and fuel	5,797,008
4-6 Medical equipment and medicines	46,072,616
4-7 Reagents and test chemicals	35,900,000
4-8 Parts and tools	8,981,088
4-9 Other materials and supplies	3,349,872
Total	<u>\$b. 430,575,296</u>

- Notes: 1. Unit: Bolivian peso  
2. Estimate made in October 1982.

**8. PROJECT EVALUATION AND PROPOSALS**

**8-1 Evaluation of the Project**

**8-2 Problems and Proposals**

## CHAPTER 8. PROJECT EVALUATION AND PROPOSALS

### 8-1 Evaluation of the Project

With the expansion of the social and economic spheres, the development of Santa Cruz City has been advancing steadily with its rapidly growing population.

However, national medical facilities for low-income classes have not been developed and the city's medical system cannot cope with the increasing population and the expanding scale of the city.

The only national general hospital in the city has rapidly become obsolete and from the operational and sanitary points of view is incapable of fulfilling its function as a core hospital.

Since the existing national medical institutions lack modern facilities and equipment and perform unsatisfactorily, many doctors and medical technicians educated abroad cannot fully display their abilities at home and are moving out of the country.

If the cases of deaths and disease in this region are aggregated the resulting pattern is that commonly observed in unsanitary districts and those with insufficient preventive medicine.

If a general hospital aiming at modern medical care is opened in such a region, the general medical situation - especially medication for low income classes - will be greatly improved. The effects will show in statistics, with fewer diseases found than in the past and with effective decrease in actual mortality rates.

Since this hospital will function as a core hospital for the region in the future, it will not only provide Santa Cruz citizens with modern medical care but also increase knowledge regarding the prevention of disease and promote health and medical care of all the inhabitants of Santa Cruz State, thereby making great contributions to the total area.

With close cooperation with other medical institutions, the quality of the medical service of these other institutions will be enhanced through the exchange of information and by using the new hospital as a model for all medical care in the region.



When the hospital is completed, the regional medical system contemplated by the Bolivian Ministry of Health and Santa Cruz State will develop steadily and so display the advances of this hospital to the medical administration.

Because this hospital has modern facilities, especially in the Central Diagnosis Department, it can offer a place for well-trained staff to display their abilities to the fullest.

This is important in order to stem the brain drain of experts and other staff from the national hospital.

## 8-2 Problems and Proposals

### (1) Administration and management

The position of the present project in the plans for Bolivian medical care in general should be established as soon as possible by the Bolivian Government.

Although the original idea was that this project would be managed by a committee formed by various related organizations in the State of Santa Cruz under the administration of the Ministry of Health, it is strongly expected that the negotiations proceed smoothly and the final agreement is reached between the two parties.

### (2) Operating budget

The management of the proposed hospital is estimated to cost 430 million pesos per annum.

The Bolivian policy is that personnel and food costs required for the management of the proposed hospital will be borne by the Ministry of Health and all other expenses by related organizations of the State of Santa Cruz.

The distributions of the burden among the related organizations should be determined.

### (3) Personnel Deployment

The acquisition of doctors and medical workers is especially important. A large number of high-quality medical workers will be necessary. It is most important to procure regular nurses to enable the hospital to fulfill its principal functions: there is presently a shortage in Santa Cruz.

Apart from medical workers, first class engineers and technicians will also be indispensable for maintaining the facilities.

The contribution which this hospital can make towards the improvement of regional medical conditions depends upon how many able staff members settle in the region.

The Bolivian Ministry of Health should take every step to procure such staff.

#### (4) Cooperation with Other Medical Institutions

It is important for this hospital, as the core hospital for the region that is expected by Bolivia, to cooperate with other medical institutions in the area.

The hospital must treat patients introduced by other hospitals or clinics in the region after screening, as well as patients visiting directly. It also must transfer its own chronic patients to the national hospital or to other hospitals treating chronic diseases to raise the efficiency of the division of their functions. It should therefore cooperate with other medical institutions through conferences and other measures.

#### (5) Maintaining a Sanitary Environment

The facilities of this hospital must be maintained in excellent sanitary condition.

However, the local national hospital is now neither clean nor sanitary, owing to limitations in its budget. This hospital will maintain cleanliness in its General Surgery Department, I.C.U., C.C.U. and other departments where a sterile environment is required.

A fundamental awareness of the importance of sanitation is required of all staff and service workers for the maintenance of the new hospital facilities.



## APPENDICES

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I. Minutes



Nº 0509033

Serie "A" - 82

D. L. 18966 de 1-6-82

R. M. 838 de 19-7-82

MINUTA DE DISCUSIONES

En atención a la solicitud formulada por el Gobierno de la República de Bolivia, el Gobierno del Japón, a través de la Agencia de Cooperación Internacional del Japón (JICA), entidad estatal encargada de la ejecución de la cooperación técnica del Gobierno del Japón, envió una Misión presidida por el señor Dr. Satoru Nakamura, profesor de la Administración Hospitalaria del Tokyo Medical Collega (en adelante se lo denominará "la misión", durante el periodo comprendido entre el 19 de octubre y el 17 de noviembre de 1982, con el propósito de realizar el diseño básico de la construcción del Hospital General en Santa Cruz ( en adelante se le denominará "el proyecto"). -----	
La misión, durante su estadía en la República de Bolivia sostuvo una serie de conversaciones e intercambios de ideas con los funcionarios de Previsión Social y Salud Pública (en adelante se le denominará "el Ministerio") y las autoridades departamentales sobre la construcción y el equipamiento del mencionado Hospital. -----	
Ambas partes acordaron recomendar a sus respectivos Gobiernos que analicen los resultados del estudio y de las conversaciones que se adjuntan al presente y que adopten las medidas necesarias para la realización exitosa del proyecto. -----	
La Paz, 29 de octubre de 1982	
<i>Satoru Nakamura</i>	
Dr. Satoru Nakamura JEFE DE LA MISION JICA	P. Dra. Edith Montesinos de Velarde SUBSECRETARIO DE SALUD PUBLICA
Dr. Jack Antelo Soliz COORDINADOR NAL PROYECTO JICA	





Nº 0509035

Serie "A" - 82

D. L. 18966 de 1-6-82  
R. M. 838 de 19-7-82

ADJUNTO

1. El objeto de proyecto es proveer los edificios, facilidades y equipo necesarios para el establecimiento del Hospital General de Santa Cruz.
2. El Hospital estará integrado por los Departamentos de medicina interna general, de cirugía y de pediatría.
3. El terreno propuesto para el proyecto será adquirido en la ciudad de Santa Cruz por la Corporación de Desarrollo de ese Departamento y la Honorable alcaldía Municipal que posteriormente pasará a propiedad del Ministerio de Previsión Social y Salud Pública. La ubicación del terreno se halla demostrado en el anexo I.
4. La contraparte Boliviana, se compromete con la Misión a que dicho Hospital tenga una administración y funcionamiento dependiente de las autoridades bolivianas, a través del Ministerio de Previsión Social y Salud Pública, las que asumirán la responsabilidad de viabilizar la construcción y el buen funcionamiento del mismo de conformidad a Normas y Reglamentos establecidos por la Autoridad de Salud.
5. El Ministerio cubrirá los gastos de funcionamiento y mantenimiento y dispondrá del personal necesario para el normal funcionamiento del Hospital coordinando con los organismos correspondientes del Departamento de Santa Cruz para la organización de un Comité que facilite el funcionamiento.
6. La Misión presentará ante el Gobierno del Japón la solicitud del Gobierno Boliviano para que se ponga en práctica el Proyecto dentro de los programas de la cooperación financiera no reembolsable del Gobierno del Japón. Las instalaciones hospitalarias, el equipamiento que integrará el hospital se enumeran en el Anexo II.
7. El Gobierno de Bolivia tomará las medidas necesarias mencionadas en el Anexo III a fin de que la asistencia del Gobierno del Japón sea efectuada con la mayor eficiencia.



ANEXO II

Los artículos requeridos por el Gobierno de Bolivia

1.- Edificios y FACILIDADES

- (1) Departamento de Consulta externa
  - a.- Sección de medicina Interna General
  - b.- Sección de Quirófano General
  - c.- Sección de Pediatría
  - d.- Sección Emergencia
  - e.- Otros.
- (2) Sala de Operaciones
- (3) Departamento de Laboratorio Central
- (4) Departamento de Internación
- (5) Departamento de Administración
- (6) Departamento de Servicio
- (7) Otros.

2.- EQUIPAMIENTO E INSTRUMENTOS MEDICOS

- (1) Equipamientos para el Departamento de Consultas externas
- (2) Equipamiento para el Departamento de sala de operaciones
- (3) Sistema de radiografías
- (4) Instrumentos de Laboratorio
- (5) Equipamiento para el Departamento de Internación
- (6) Equipamiento para el Departamento de Servicio
- (7) Otros.

ANEXO III

Las siguientes normas que debe cumplir el Gobierno Boliviano son:

- 1.- Asegurar el lote necesario para la construcción y nivelar, ordenar la tierra, si es necesario, antes de la construcción
- 2.- Proveer las siguientes facilidades, electricidad, teléfono, agua potable, y alcantarillado.
- 3.- Asegurar el inmediato descargue y liberación de impuestos en la aduana del puerto de desembarque, y el inmediato transporte de los artículos comprados bajo la subvención.
- 4.- Liberación de aduana e impuesto para los súbditos japoneses y otras leyes fiscales impuestas en Bolivia con respecto al abastecimiento para el producto y el servicio bajo el contrato hecho.
- 5.- De acuerdo con los súbditos japoneses, cuyo servicio puede ser requerido en relación al abastecimiento de los productos y servicios bajo el contrato hecho, cuyas facilidades pueden ser necesarias para su entrada a Bolivia y su estadía en ella hasta que termine su trabajo.
- 6.- Mantener y utilizar adecuada y eficazmente las facilidades construidas y equipamientos comprados bajo la subvención.
- 7.- Cubrir todos los gastos, menos los que cubra la subvención, necesarios para la construcción tanto como la transportación interna de los artículos y servicios bajo la subvención.
- 8.- Si es necesario, encargará un trabajo civil espontáneo como implantar árboles y hacer una tápia.

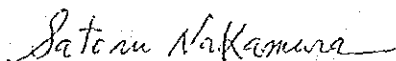
MINUTES OF DISCUSSIONS  
ON  
THE DRAFT REPORT ON THE BASIC DESIGN STUDY  
FOR THE ESTABLISHMENT PROJECT OF  
SANTA CRUZ GENERAL HOSPITAL

The Government of Japan has sent, through Japan International Cooperation Agency (JICA) a Team to the Republic of Bolivia from 1st to 13rd March, 1983 with the object to submit and discuss on the Draft Report on the Basic Design Study for the Establishment Project of Santa Cruz General Hospital (the Project) and to confirm the organization for administration and Implementation of the Project.

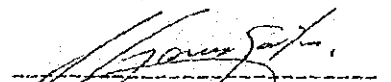
The Team held meetings with the authorities and organizations concerned of the Government of Bolivia and Santa Cruz State. The Discussions between the Team and the organizations concerned in Santa Cruz State is summarized in Annex.

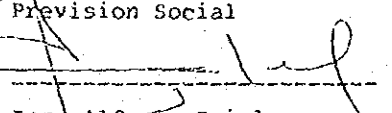
This Minutes records the major points of discussions of meetings, subject to further review and approval for respective Governments for the implementation of the Project.

9th March, 1983, La Paz



Dr. Satoru Nakamura  
Leader, Japanese Study Team

  
Dr. Javier Torres Goitia  
Ministro de Salud Pública y  
Prevision Social

  
Ing. Alfonso Criales  
Subsecretario de Coordinación  
Ministerio de Planeamiento y  
Coordinación

1. Ministry of Social Welfare and Public Health and Ministry of Planning and Coordination organized the (Central) Committee to study the Draft Report from economical and technical point of view.

The (Central) Committee was satisfied with the Draft Report in principle.

2. Ministry of Social Welfare and Public Health will take overall responsibility for administration and implementation of the Project. The organizations concerned in Santa Cruz State will organize the (Regional) Committee and it will work as implementing organization.

Unidad Sanitaria will be the leading organization of the (Regional) Committee and will take overall responsibility for implementing the Project.

Ministry of Social Welfare and Public Health will administrate the (Regional) Committee through the Unidad Sanitaria.

Ministry of Planning and Coordination will coordinate the matters concerning the Project.

3. The (Regional) Committee will make the agreement on the function of the (Regional) Committee and the duties of each member among its members and the Ministry of Social Welfare and Public Health will submit it to Japanese side through the diplomatic channel, after the clearance of Ministry of Planning and Coordination.
4. Ministry of Social Welfare and Public Health and Ministry of Planning and Coordination aproved the Summary of Discussions annexed herewith.
5. Final Report will be submitted to the Bolivian side until the end of April, 1983.

Summary of Discussions of Joint Meeting between the Japanese Study Team and the Bolivian Side at Santa Cruz

1. The Japanese Study Team (the Team) submitted the Draft Report to the Bolivian Side and explained on it.
2. The Hospital will be a general Hospital with department of Internal Medicine, General Surgery, Pediatrics and ward of 200 beds.
3. The Central Diagnosis Department will have facilities for 400 beds considering the future expansion of additional ward of 200 beds.
4. Items of the Medical Equipment listed in the Draft Report has been selected taking into consideration the function of the Hospital as well as easy operation and low cost of running and maintenance.
5. The Bolivian Side was satisfied in principle with the Draft Report and technical alternation was not proposed from the Bolivian Side. Technical details will be progressed based on the Draft Report in the implementation stage of the Project.
6. The Team emphasized that the confirmation of implementing organization of Bolivian Side is of very important for the Team.
7. The Bolivian Side will organize the Committee "COMITE REGIONAL DE ADMINISTRACION DEL HOSPITAL GENERAL JAPONES DE SANTA CRUZ" to coordinate internal subjects of Santa Cruz State and promote the Project. The Committee will be organized with the member listed below and will work as implementing organization of the Project in mutual consultation with the Government.

- a. COMITE PRO-SANTA CRUZ
- b. CORDECRUZ
- c. ALCALDIA MUNICIPAL
- d. UNIDAD SANITARIA
- e. COLEGIO MEDICO DEPARTAMENTAL
- f. FEDERACION DEPARTAMENTAL DE PROFESIONALES
- g. SOCIEDAD CRUCEÑA DE SALUD PUBLICA
- h. CRUZ ROJA DEPARTAMENTAL
- i. CAMARA DE INDUSTRIA Y COMERCIO (DEPARTAMENTAL)
- j. CAMARA AGROPECUARIA DEL ORIENTE

8. The Bolivian Side has assured that the Ministry of Social Welfare and Public Health (the Ministry) and the Committee will take necessary measures and will bear all the expenses other than those to be borne by the Grant necessary for the implementation of the Project.

- a. Regarding the operating cost of the Hospital, Personnel Expenses and Food Supply will be basically borne by the Ministry and others will be basically borne by the Committee.
- b. The said Committee will recruit and assign relevant manpower to the Hospital.  
Regarding the allocation of doctors, the Team pointed out that the doctors should belong exclusively to the Hospital for appropriate functioning of the Hospital.
- c. Regarding the Scope of Work (page 76 of the Draft Report) that should be basically contributed by Santa Cruz, the Committee will decide the sharing organization of necessary fund within two weeks and will submit it to the Japanese side after the clearance of the Ministry, Ministry of



Planning and Coordination and others.

The Bolivian Side has assured that the necessary work for Bolivian side should be completed before the start of the construction work by the Grant Under the supervision of Japanese consultant.

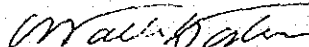
The Team pointed out that the clearance and leveling of the site and preparation of drain route for sewage and rainwater from the site are of the higher priority.

8th March, '83, Santa Cruz

(The Bolivian Side)



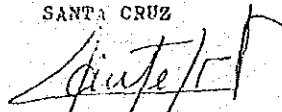
Dr. Satoru Nakamura  
LEADER OF THE TEAM



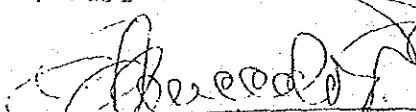
Dr. Walter Julio Fortín  
JEFE DE UNIDAD SANITARIA DE  
SANTA CRUZ



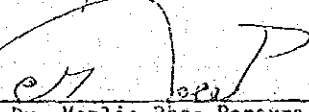
ARQ. SERGIO ANTELO  
ALCALDE MUNICIPAL



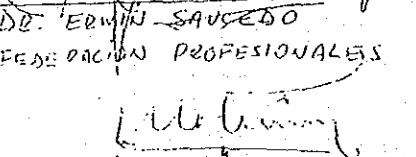
Dr. Jack Antelo Soliz  
COORDINADOR NACIONAL DEL PROYECTO



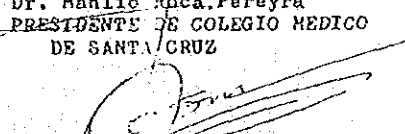
DR. ERWIN SAUCEDO  
FEDERACION PROFESIONALES



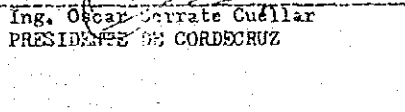
Dr. Manlio Roca Pereyra  
PRESIDENTE DE COLEGIO MEDICO  
DE SANTA CRUZ



DR. JOAQUÍN MONASTERIO  
PREFECTO DEPARTAMENTAL



Ing. Oscar Garrate Cuéllar  
PRESIDENTE DE CORDECruz



Ing. Percy Fernández  
PRESIDENTE DEL COMITE PRO-SANTA  
CRUZ.

2. Letter from Santa Cruz Requesting Cooperation

Santa Cruz, 28 de octubre de 1.982

Señor doctor  
Dn. Mario Argandoña  
MINISTRO DE PREVISION SOCIAL Y SALUD PUBLICA  
La Paz.

REF: APOYO GUBERNAMENTAL PARA CONSTRUCCION DE HOSPITAL GENERAL.

Excmo. señor Ministro:


Nuestro país y particularmente el pueblo de Santa Cruz, podrían ser favorecidos con la generosa ayuda del Gobierno del Japón, consistente en la construcción y equipamiento de un hospital general en la ciudad de Santa Cruz de la Sierra, sin más condición que el aporte nacional y/o local de proporcionar el terreno adecuado por su ubicación y superficie y el expreso compromiso de mantener técnica y económicamente la operación del hospital desde el momento de su funcionamiento.

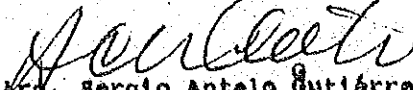
Las instituciones de Santa Cruz: Corporación Regional de Desarrollo, Alcaldía Municipal, Unidad Sanitaria, Colegio Médico, Sociedad Boliviana de la Salud Pública y Federación Departamental de Profesionales, representadas por sus titulares, manifiestan su gran interés por esta magnífica obra de sentida necesidad para nuestra región y para la salud de su numerosa población.

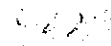
De ahí, que sin desconocer el compromiso formal del Gobierno de Bolivia a través de ese importante Portafolio, se esté organizando un Comité de Promoción y de Soporte del Hospital General a construirse con recursos del Gobierno, del Japón, con la finalidad de coadyuvar al financiamiento necesario para su operación y mantenimiento, sin que esta manifiesta voluntad, signifique lo repetimos relevar al Ministerio de Salud, de sus obligaciones y atribuciones con relación a este hospital. En este sentido, hacemos conocer a Ud., esta nuestra positiva cooperación con la esperanza de materializar en el menor tiempo posible tan anhelada obra de defensa de la salud de nuestra población, rogándole prestar todo el apoyo necesario del Supremo Gobierno hasta su conversión en realidad.

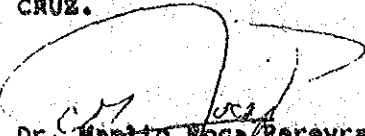
//..

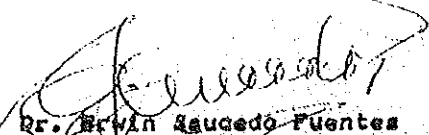
Con este especial motivo, saludamos a Ud., señor Ministro, con nuestras mayores consideraciones de distinción.

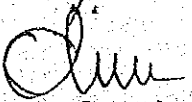
  
Ing. Mario Selame Antelo  
PRESIDENTE DE CORDECruz

  
Arq. Sergio Antelo Gutiérrez  
ALCALDE MUNICIPAL DE SANTA  
CRUZ.

  
Dr. Walter Julio Fortún  
JEFE DE UNIDAD SANITARIA

  
Dr. Mario Woca Pareyra  
PRESIDENTE COLEGIO MEDICO  
DE SANTA CRUZ.

  
Dr. Edwin Saucedo Fuentes  
VICE PRESIDENTE FEDERACION  
DPTAL. DE PROFESIONALES DE  
SANTA CRUZ.

  
Dr. Oscar Gonzales Mack  
PRESIDENTE DE LA SOCIEDAD  
BOLIVIANA DE SALUD PUBLICA.

3. Members of the Survey Team

(1) Members of basic design study mission

Satoru Nakamura M.D.	Team Leader Professor of Hospital Administration Tokyo Medical College
Toshiyuki Ando	Grant Aid Second Economic Cooperation Division Economic Cooperation Bureau Ministry of Foreign Affairs
Norio Shimomura	Coordination of the Project Basic Design Division, Grant Aid Department, Japan International Cooperation Agency
Hajime Murate	Senior Architect Nihon Architects, Engineers & Consultants, Inc.
Toshiyuki Koike	Architect Nihon Architects, Engineers & Consultants, Inc.
Masahisa Fukumura	Structural Engineer Nihon Architects, Engineers & Consultants, Inc.
Shouhei Katsumata	Electrical Engineer Nihon Architects, Engineers & Consultants, Inc.
Masayoshi Funatsu	Mechanical Engineer Nihon Architects, Engineers & Consultants, Inc.
Masato Okano	Architect (Cost Estimation) Nihon Architects, Engineers & Consultants, Inc.
Kyoichi Izawa	Medical Equipment Engineer Nihon Architects, Engineers & Consultants, Inc.

(2) Members of draft report explanation mission

Satoru Nakamura M.D. Team Leader  
(detailed in (1))

Norio Shimomura (detailed in (1))

Hajime Murate (detailed in (1))

Kyoichi Izawa (detailed in (1))

#### 4. Bolivian Authorities Concerned

##### (1) Authorities concerned in La Paz

Dr. Javier Torrez Goitia	Ministro de Previsión Social y Salud Pública
Dr. Mario Argandoña	Ministro de Previsión Social y Salud Pública (anterior)
Dr. Jack Antelo Soliz	Coordinador Nacional del Proyecto
Dr. Guillermo Cuentas Yañez	Director Relaciones Internacionales del Ministerio Prevision Social y Salud Pública
Lic. Eddy Jimenez	Directora Administración Financiera del Ministerio Prevision Social y Salud Pública
Arq. Oscar Bacherer Soliz	Ministerio de Prevision Social y Salud Pública
Téc. Francisco Peñaloza	Ministerio de Previsión Social y Salud Pública
Ing. Alfonso Criales	Subsecretario de Coordinación Ministerio de Palneamiento y Coordinación

##### (2) Authorities concerned in Santa Cruz

Dr. Walter Julio Fortún	Jefe de Unidad Sanitaria de Santa Cruz
Dr. Rafael Yllanes	Planificador de Salud Unidad Sanitaria
Dr. Manlio Roca Pereyra	Presidente de Colegio Medico de Santa Cruz
Dr. Wilson Flores	Director del Hospital San Juan de Dios
Dr. Oscar Gonzales Lack	Director del Hospital de Niños
Dr. Jose Serrate Aguilera	Director de Hospital Caza Petrolera S.S.
Ing. Percy Fernández	Presidente del Comité PRO-Santa Cruz

Ing. Oscar Serrate Cuéllar	Presidente de CORDECRUZ
Arq. Marta Aramayo Roca	Asesor Unidad de Proyectos CORDECRUZ
Arq. Angel Rea	Planificación Física CORDECRUZ
Arq. Sergio Antelo Gutierrez	Alcalde Municipal de Santa Cruz
Arq. Julio Cesar Sanchez S.	Jefe Departamento Implementacion Consejo del Plan Regulador
Arq. Martha de Ichaso	Director Obras Públicas Alcaldia Municipal
Dr. Erwin Saucedo Fuentes	Vice Presidente Federación Departamental de Profesionales de Santa Cruz

## 5. Survey Schedule

### (1) Itinerary of basic design study mission

<u>Date</u>	<u>Itinerary</u>
19 Oct., (Tue.)	Survey team (I) depart Narita Narita PA 800 19:15 ~ New York 18:45
20 Oct., (Wed.)	Depart New York AA 653 11:45 ~ San Juan LH 512 15:17
21 Oct., (Thu.)	Arrival La Paz Inspect La Paz Centro de Gastroenterología Inspect National Hospital Visit to Embassy and arrange schedule Visit to JICA Office and arrange schedule
22 Oct., (Fri.)	Meeting with the Vice-Minister of Health Courtesy call on Minister of Health Meeting with Director of International Relations Dept. Inspect Metodista Hospital (private hospital)
23 Oct., (Sat.)	Internal meeting Arrange materials
24 Oct., (Sun.)	Depart La Paz LB 807 9:00 ~ Cochabamba 9:30 Inspect CBB Medical Training School Inspect CBB Centro de Gastroenterología Depart Cochabamba LB 823 15:00 ~ Santa Cruz 15:30
25 Oct., (Mon.)	Visit to JICA Office and Consulate Meeting with Health Department of Santa Cruz Courtesy call on Mayor of Santa Cruz Visit to Public Development Corporation
26 Oct., (Tue.)	Inspect San Juan de Dios Hospital Inspect Petroleum Corporation Hospital Inspect the site Meeting with Medical Association of City of Santa Cruz
27 Oct., (Wed.)	General meeting (Health Dep., Public Corpora- tion, City Development) Inspect National Children's Hospital Internal meeting (hospital scale etc.) Report to JICA Office Depart Santa Cruz LB 810 17:00 ~ La Paz 18:35



28 Oct., (Thu.) Survey reports to Minister and Vice-Minister of Health, and Director of International Relations Dept.  
Study of minutes  
Survey team (II) depart Narita  
Narita PA 800 19:15 ~ New York 18:45

29 Oct., (Fri.) Make minutes  
Survey team (II) depart New York  
Sign minutes (at the Ministry of Health)  
Survey reports to Embassy

30 Oct., (Sat.) Survey team (II) Arrival La Paz  
Survey team (I), (II) general meeting

31 Oct., (Sun.) Survey team (I), (II) general meeting  
Survey team (I) depart La Paz

1 Nov., (Mon.) Visit to Embassy  
Arrange schedule  
Courtesy call on JICA Office  
Visit to the Ministry of Health  
Inspect La Paz Centro de Gastroenterología  
Inspect Metodista Hospital

2 Nov., (Thu.) Internal meeting  
Analyze materials  
Study survey results

3 Nov., (Wed.) Depart La Paz LB 8:00 ~ Santa Cruz 9:50  
Visit to the Consulate and report schedule  
Arrange schedule with JICA Office  
Visit to the Ministry of Health  
Site visit during boring operations

4 Nov., (Thu.) Inspect San Juan de Dios Hospital  
Survey the construction site  
General meetings (Health Dep., Dep. of City Development, Medical Association)  
Inspect Petroleum Corporation Hospital

5 Nov., (Fri.) Survey the construction site  
Inspect IBC Laboratory Center  
Internal meetings  
Survey medical treatment equipment  
Report the following week's schedule arrangement to JICA Office

6 Nov., (Sat.) Survey the city building situation

7 Nov., (Sun.)	Internal meetings (outline of plan study)
8 Nov., (Mon.)	Attend the general construction site (Public Corporation of Development, Department of Architecture)
9 Nov., (Tue.)	Survey traffic relations, costs and materials General meeting (Health Dep., Medical Association)
10 Nov., (Wed.)	Survey costs and materials Collect weather data General meeting (Health Dep., Dep. of City Development, Medical Association)
11 Nov., (Thu.)	Report to JICA Office Courtesy call on the Consulate Inspect clinics in the city Courtesy call on persons concerned Depart Santa Cruz LB 18:30 ~ La Paz 19:20
12 Nov., (Fri.)	Courtesy call on JICA Office and Embassy Report to the Ministry of Health
13 Nov., (Sat.)	Collect statistics Settlement and confirmation of survey results Internal meetings
14 Nov., (Sun.)	Survey team (II) return La Paz LB 902 18:40 ~ Miami 5:05
15 Nov., (Mon.)	Miami PA 440 8:00 ~ Los Angeles 10:36
16 Nov., (Tue.)	Los Angeles PA 21 12:00 ~
17 Nov., (Wed.)	PA 21 ~ Arrive Narita 16:20

(2) Itinerary of draft report explanation mission

<u>Date</u>	<u>Itinerary</u>
1 Mar., (Tue.)	Dep. Narita JL062 17:20 Arr. Los Angeles 09:30
2 Mar., (Wed.)	Dep. Los Angeles RG845 12:30 Arr. La Paz 04:55
3 Mar., (Thu.)	Dep. Lima LH512 02:10 Arr. Lima 04:55 Courtesy call to the Embassy. Schedule arranged. Courtesy call to JICA Office. Schedule arranged. Consultation with the Director of International Co- operation, Ministry of Foreign Affairs.
4 Mar., (Fri.)	Courtesy call to the Minister of Health. Consultations with the Ministry of Health and Ministry of Planning officials. Courtesy call to the Vice-Minister, Ministry of Planning and Coordination.
5 Mar., (Sat.)	Dep. La Paz LB855 09:00 Arr. Santa Cruz 09:50 Courtesy call to JICA Office. Schedule arranged. Visit to the site of the proposed hospital.
6 Mar., (Sun.)	Visit to the clinic at the settlement of Okinawan immigrants. Team briefing.
7 Mar., (Mon.)	Explanation of draft for officials of Santa Cruz Health Bureau and Medical Association. Explanation of draft for the city officials and CORDECRUZ. Courtesy call and explanation of draft to Pro-Santa Cruz Committee.
8 Mar., (Tue.)	Visit to IBC Laboratory Center. Visit to the Consulate and JICA Office. Meeting with officials of Health Bureau, CORDECRUZ and Medical Association. Dep. Santa Cruz LB912 17:45 Arr. La Paz 18:30

9 Mar., (Wed.) Meeting with officials of the Ministry of Health and Ministry of Planning and Coordination.  
Minutes signed by the Minister of Health.  
Consultation with officials of the Ministry.

10 Mar., (Thu.) Courtesy call and report to the Embassy and JICA Office.  
Dep. La Paz EA010 21:30

11 Mar., (Fri.) Arr. Miami 10:00  
Dep. Miami PA463 12:30 ~ Arr. Mexico 14:45

12 Mar., (Sat.) Dep. Mexico JL011 12:30

13 Mar., (Sun.) Arr. Narita 20:05

6. Santa Cruz State Health Statistics

(1) The causes of death inside the house in the State of Santa Cruz  
(ten most common)

1. Accident, poisoning
2. Dysentery and forms of diarrhea
3. Tuberculosis
4. Perinatal disorders
5. Nervous and other disorders of sense organs
6. Acute respiratory disorders
7. Heart and circulatory organ disorders
8. Urinary organ and metabolic function disorders
9. Digestive disorders
10. Chronic bronchitis, pulmonary emphysema, asthma

(2) Admission statistics to hospitals in the State of Santa Cruz  
(1980, ten most common)

	No. of cases
1. Normal labor	12,004
2. Abnormal labor	4,564
3. Digestive disorders	3,561
4. Accident, poisoning, injury	3,538
5. Dysentery and forms of diarrhea	2,833
6. Acute respiratory disorders	1,034
7. General and other urinary tract disorders	987
8. Skin and muscular tissue disorders	793
9. Tuberculosis	725
10. Chronic bronchitis, pulmonary emphysema, asthma	723

(3) Outpatients' medical examination statistics in the State of Santa Cruz (1980, ten most common)

	No. of cases
1. Acute respiratory disorders	21,889
2. Skin and muscular tissue disorders	19,137
3. Digestive disorders	15,733
4. Dysentery and forms of diarrhea	14,043
5. Accident, poisoning, injury	9,568
6. Normal labor	9,506
7. Nervous and sensory disorders	9,212
8. Chronic bronchitis, pulmonary emphysema, asthma	8,487
9. Observation of healthy infants	8,259
10. Genital and other urinary tract disorders	7,210

7. Estimated Population Increases for Each State and Major City

BOLIVIA: ESTIMACIONES DE LA POBLACION POR DEPARTAMENTOS  
1980 - 1990 POBLACION AL 1º DE JULIO

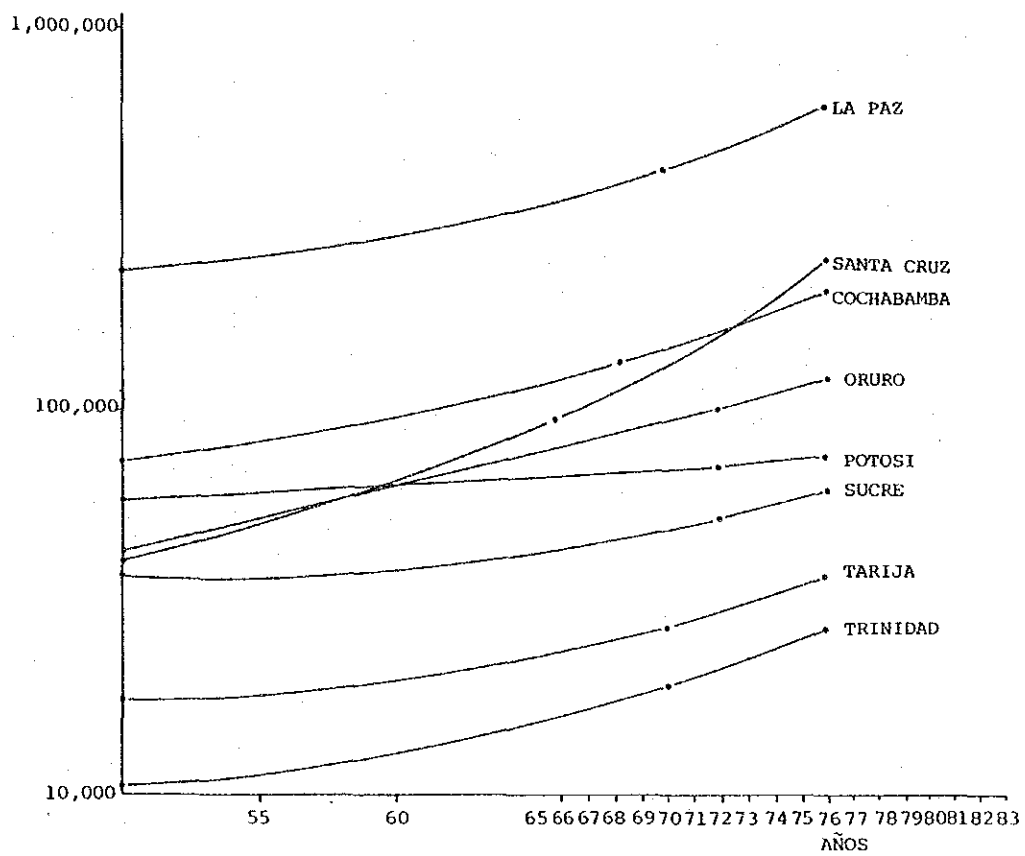
DEPARTAMENTOS	A Ñ O S		
	1980	1985	1990
TOTAL	5.599.592	6.429.226	7.399.724
Chuquisaca	422.209	462.904	506.881
La Paz	1.800.269	2.091.429	2.435.249
Cochabamba	864.577	979.171	1.111.439
Potosí	788.983	878.232	978.244
Oruro	367.893	412.756	463.223
Santa Cruz	879.136	1.047.964	1.251.293
Tarija	232.383	270.027	315.228
Beni	204.385	239.810	282.669
Pando	39.757	46.933	55.498

BOLIVIA: ESTIMACIONES DE LA POBLACION POR CIUDADES  
CAPITALES: AÑOS 1980 - 1990

CIUDAD CAPITAL	A Ñ O S		
	1980	1985	1990
TOTAL	1.825.243	2.235.840	2.737.338
Sucre	76.546	86.609	97.727
La Paz	812.641	992.592	1.212.267
Cochabamba	260.324	317.251	385.447
Potosí	96.887	113.380	132.454
Oruro	152.234	178.393	208.775
Santa Cruz	338.643	441.717	572.717
Tarija	49.986	60.621	73.732
Trinidad	33.764	40.288	48.308
Cobija	4.218	4.989	5.911

### 8. Population Changes in Major Bolivian Cities

BOLIVIA: TENDENCIA DE POBLACION CENSADA  
SEGUN CIUDADES CAPITALES 1950~1976





9. Numbers of Medical Personnel (by State)

PERSONAL QUE PRESTA SERVICIOS EN ESTABLECIMIENTOS DE SALUD DEL SECTOR PUBLICO

AÑO: 1978

DEPARTAMENTOS	TOTAL		ESPECIALIDAD DE TRABAJO			
	Personal	%	Médicos	Paramédicos	Administrativos	De Servicios
Chquisaca	952	6.66	260	286	179	227
La Paz	5.362	37.50	1.254	1.157	1.807	1.144
Cochabamba	1.628	11.39	445	511	374	298
Oruro	1.110	7.76	263	384	186	277
Potosí	1.799	12.58	349	620	348	482
Tarija	857	6.00	162	234	317	144
Santa Cruz	2.046	14.31	532	886	262	366
Beni	468	3.27	126	239	40	63
Pando	76	0.53	19	46	4	7
TOTAL	14.298	100.00	3.410	4.363	3.517	3.008

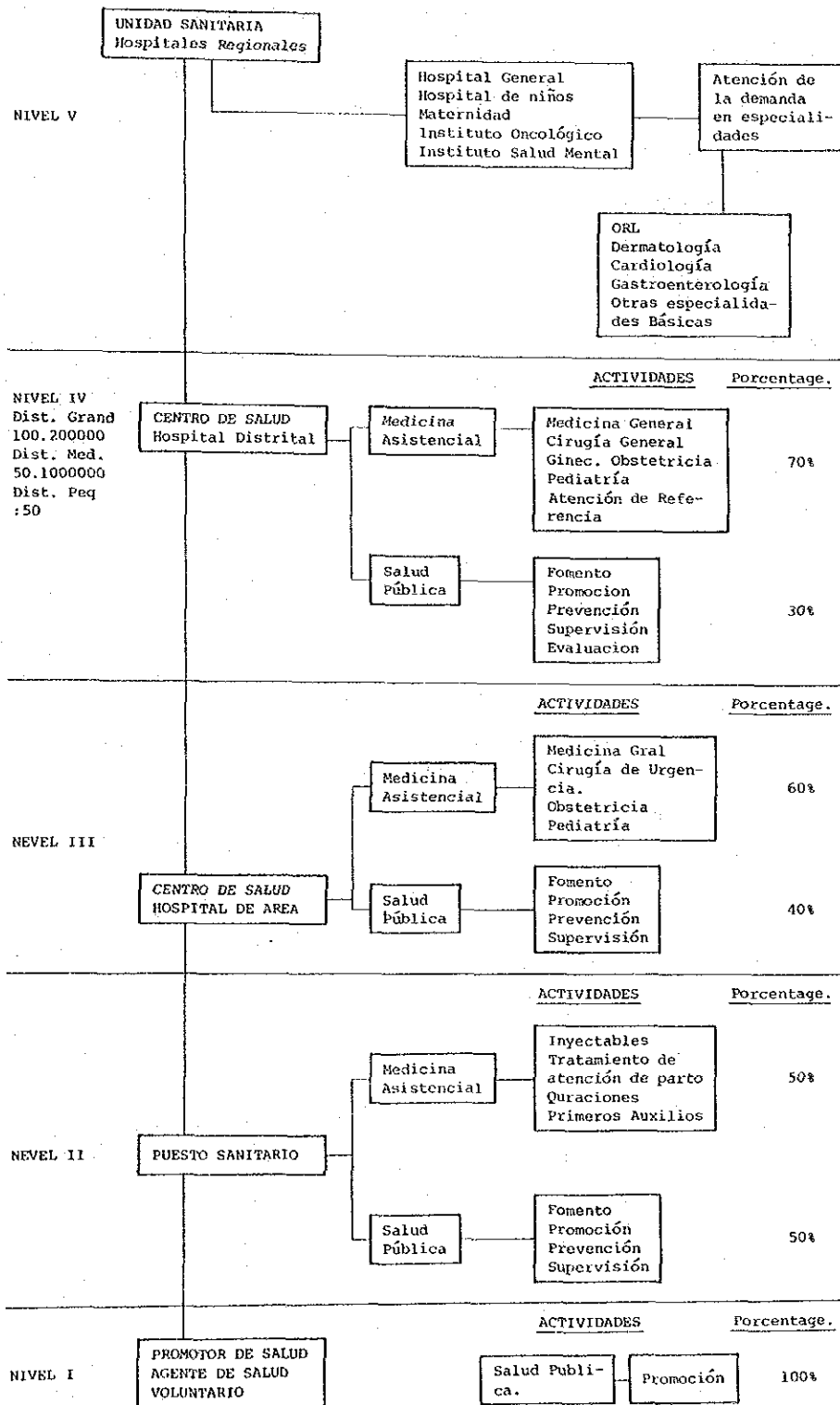
FUENTE: INSTITUTO NACIONAL DE ESTADISTICA

INSTITUTO BOLIVIANO DE SEGURIDAD SOCIAL.

10. Regional Medical Organization in Santa Cruz State

ESQUEMA DE ORGANIZACION GENERAL Y ATENCION POR NIVELES

SISTEMA REGIONALIZADO

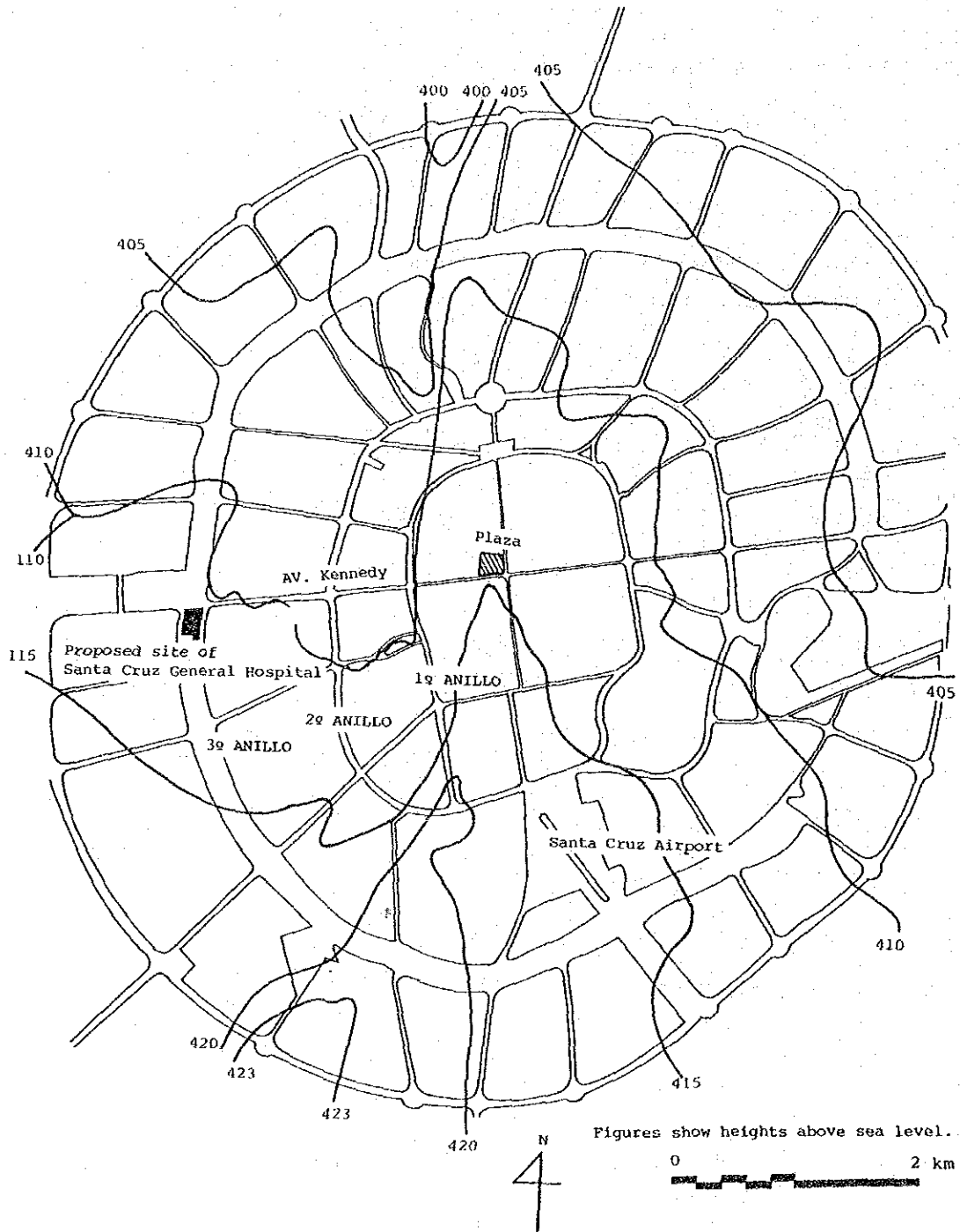


## 11. Design Standards for Hospital Construction

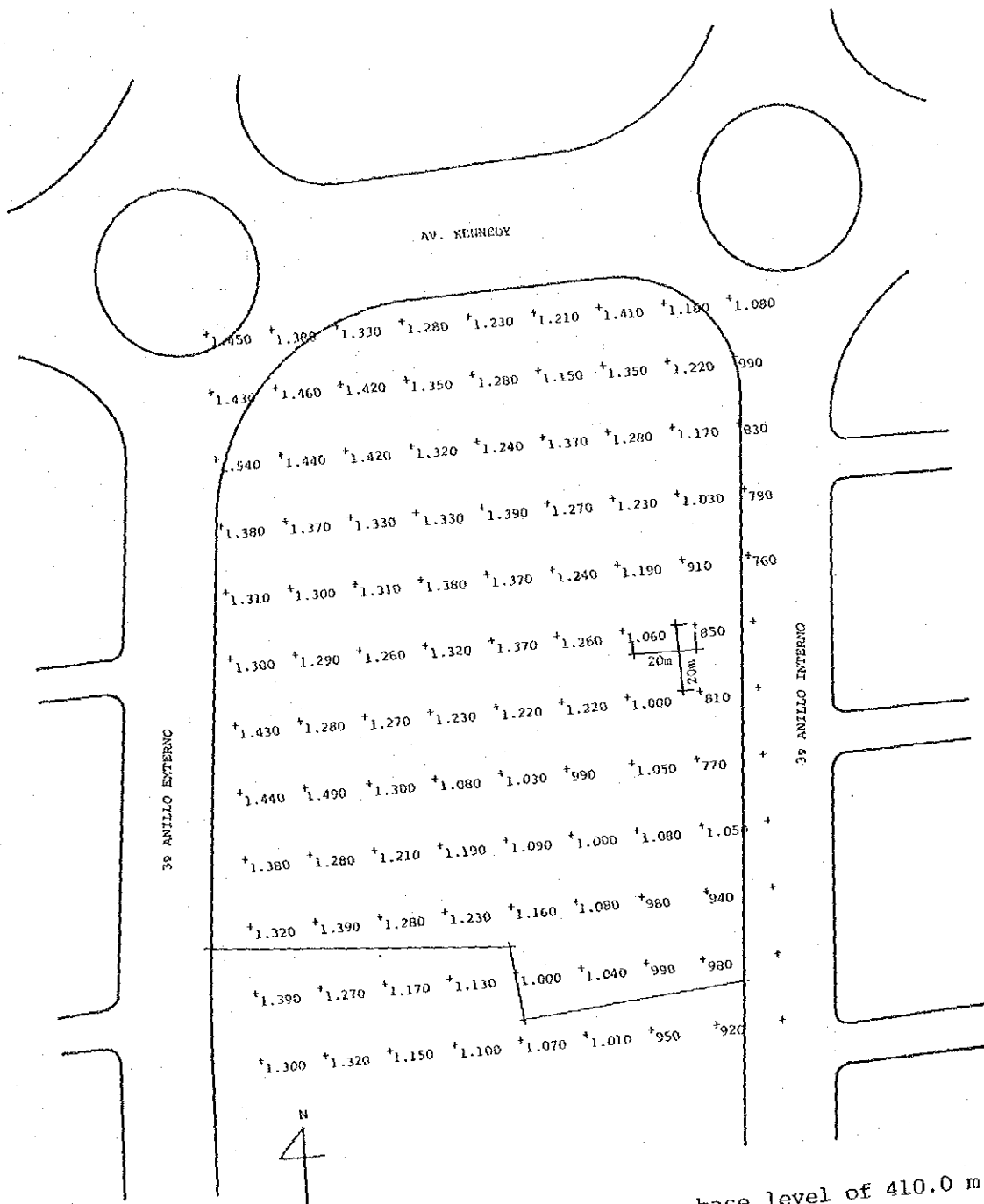
- a) Hospitals, clinics and other similar buildings should be more than 5 m away from the site boundaries.
- b) Hospital wards should meet the following conditions.
  - 1) Maximum number of beds per room: 8 beds
  - 2) Minimum floor area per bed: 6.00 m<sup>2</sup>
  - 3) Minimum story height: 3.00 m
  - 4) Minimum width for doors: 1.00 m
  - 5) The walls should be flat, covered with waterproof material to 1.5 m above the floor level, and with rounded corners.
- c) Those floors with sick rooms should be provided with storerooms for materials used daily in the hospital. The minimum floor space is to be 4.00 m<sup>2</sup> for a group of 12 beds and 9.00 m<sup>2</sup> for a group of 24 beds.
- d) The floors of operation, anesthetic and oxygen rooms should be covered with appropriate material to prevent static electricity. Sockets, switches and electrical equipment should not spark.
- e) Minimum number of toilets, baths, etc.
  - 1) 1 toilet and 1 washroom per 8 beds.
  - 2) 1 bath and 1 shower per 12 beds.
  - 3) 1 toilet and 1 washroom for employees per floor.
- f) The minimum floor space for a kitchen is to be 0.75 m<sup>2</sup> per bed up to a total capacity of 200 beds. If the number of beds exceeds 200, there should be 1.5 m<sup>2</sup> per additional bed.
- g) Corridors for the transport of patients should have a width of more than 2.00 m.
- h) Staircases should have a width of more than 1.50 m. Slopes should have a grade of less than 10%. The distance to the nearest staircase should not exceed 30.00 m on any floor.

- i) Hospital buildings of more than four stories should be equipped with elevators, which should meet the following conditions.
  - 1) The elevators should serve up to the fourth floor.
  - 2) Hospital buildings of more than five stories should be equipped with more than one elevator.
- j) Water should be stored at a rate of more than 400ℓ per bed.
- k) A laundry, a fabric sterilization room, an incinerator and fire-fighting facilities should be provided.
- l) More than 20% of building area should be reserved for automobile parking.

12. Santa Cruz City Ground Elevation Map

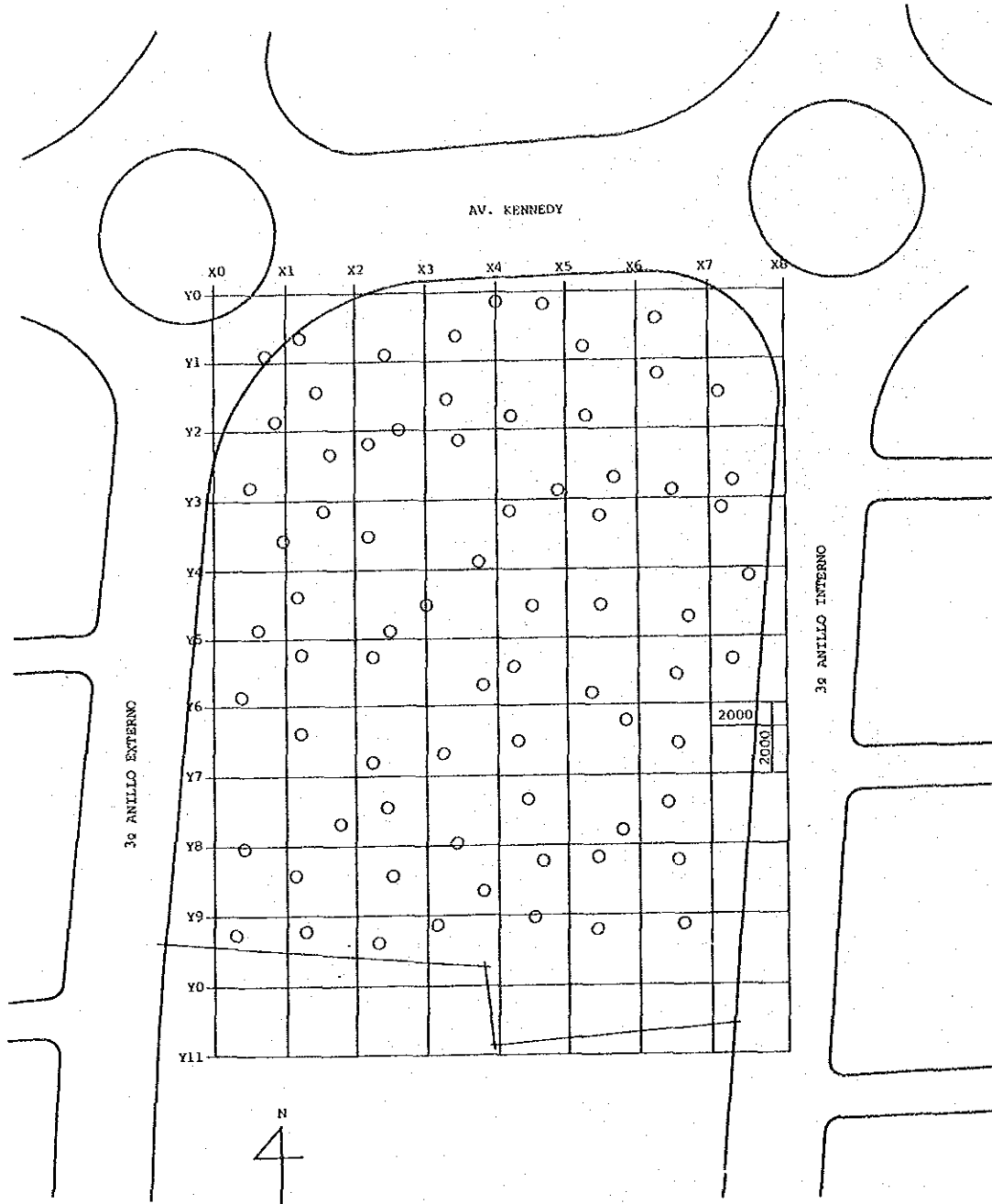


13. Side Elevation Survey Map



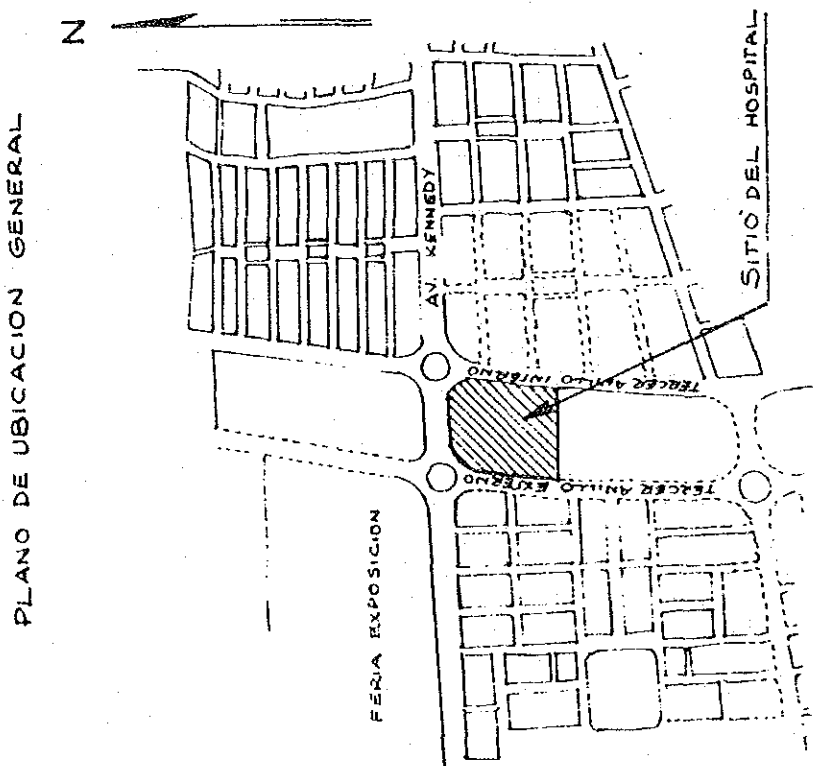
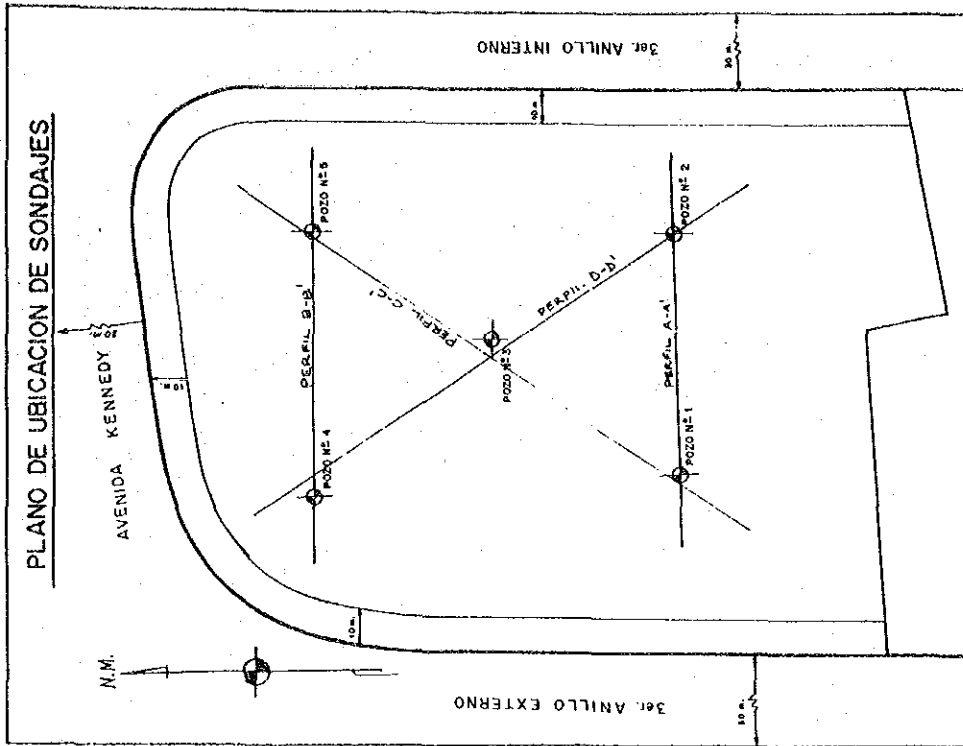
Note: The figures show elevations from a base level of 410.0 m.

14. Position of Trees on the Site



Note: Only trees of a diameter of more than 50 cm are shown. Those of less than 50 cm in diameter are estimated to average 15 per 400 m<sup>2</sup>.

15. Ground Survey Data







ING. FAJAL SADDU Q.  
geotecnia.  
mecanica de suelos  
fundaciones.

DPTO.: LABORATORIO DE SUELOS.

### CUADRO RESUMEN DE ENSAYOS

PROYECTO: HOSPITAL SANTA CRUZ

FECHA: Noviembre, 1982

SONDAJE N°	PROFUNDIDAD m.	HUMEDAD NATURAL %	TAMICES % que pasa				LL	LP	IP	N° GOLPES/ 30 cm. penetra.	CLASIFICACION U.S.C.S.
			10	40	100	200					
3	1.0 - 1.8	14.4	100	93	38	18	-	-	NP	7	SM
	1.8 - 2.9	14.5	97	72	20	9	-	-	NP	8	SM - SP
	2.9 - 4.0	14.0	96	76	15	8	-	-	NP	13 *	SM - SP
	4.0	14.3	99	84	26	14	-	-	NP	10	SM
	5.0	15.6	100	94	50	20	-	-	NP	14	SM
	5.0 - 6.9	14.5	99	89	42	21	-	-	NP	16 *	SM
	7.0	14.0	99	90	44	24	-	-	NP	10	SM
	8.0 - 9.0	13.8	100	90	34	15	-	-	NP	19 *	SM
	9 - 11	13.6	99	92	36	16	-	-	NP	30 *	SM
	11 - 12	12.8	100	94	42	19	-	-	NP	20 *	SM
	12 - 13	14.7	100	91	55	23	-	-	NP	30 *	SM
	13 - 14	15.9	97	88	29	7	-	-	NP	36 *	SM - SP
	14 - 15	15.6	96	90	26	6	-	-	NP	35 *	SM - SP
	15. 15.5	14.0	97	89	32	9	-	-	NP	38 *	SM - SP

ING. FAJAL SADDU Q.  
geotecnia.  
mecanica de suelos  
fundaciones.

DPTO.: LABORATORIO DE SUELOS.

### CUADRO RESUMEN DE ENSAYOS

PROYECTO: HOSPITAL SANTA CRUZ

FECHA: Noviembre, 1982

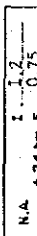
SONDAJE N°	PROFUNDIDAD m.	HUMEDAD NATURAL %	TAMICES % que pasa				LL	LP	IP	N° GOLPES/ 30 cm. penetra.	CLASIFICACION U.S.C.S.
			10	40	100	200					
4	0.0 - 1.0	15.9	99	95	77	72	26.1	15.9	10.2		CL
	1.0 - 2.0	16.7	99	87	18	6	-	-	NP	4	SM - SP
	2.0 - 3.6	14.4	99	81	30	12	-	-	NP	10	SM - SP
	3.6 - 3.7	25.4	100	98	89	72	18.6	15.4	3.2	4	ML
	3.7 - 4.75	17.7	100	99	53	18	-	-	NP	16 *	SM
	4.75 - 5.50	18.0	100	97	30	10	-	-	NP	17 *	SM - SP
	5.5 - 6.25	12.2	96	80	31	10	-	-	NP	10	SM - SP
	6.25 - 7.5	30.9	99	97	93	88	25.9	18.9	7.0	8	CL - ML
	7.5 - 8.45	18.8	99	93	24	11	-	-	NP	20 *	SM - SP



PERFIL GEOTECNICO DE SONDAJE

PROYECTO: HOSPITAL SANTA CRUZ  
 UBICACION: Tercer anillo oeste  
 FECHA: Inicio: 08/11/82  
 Fin: 08/11/82

COTA: Terreno natural



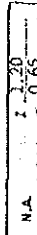
Pozo N° 1

Profundidad	Espesor Capa	Nivel Agua	Perfil Geológico	DESCRIPCION DEL MATERIAL	Humedad Natural %	Límite Líquido %	Índice de Plasticidad P	N° golpes / 30 cm	Clasificación U.S.C.S.	Fotografía Admitida (kg/cm2)
0.30				Materia orgánica						
1.2	1.2			Arcilla color rojizo marrón muy plástica, humedad media					CH	0.6
1.2				Arena limosa, grano fino a medio color amarillenta. Grisácea, saturada					SM	0.7
2.5				Arena, color blanquecino amarillenta, grano medio, saturada					SM - SP	0.6
4.0	1.5			Limo arenoso color gris claro					ML	1.0
5.0	1.0			Arena limosa de grano fino a medio, color blanquecino amarillenta					SM	1.5
5.45				* Fin pozo						

PERFIL GEOTECNICO DE SONDAJE

PROYECTO: HOSPITAL SANTA CRUZ  
 UBICACION: Tercer anillo oeste  
 FECHA: Inicio: 11/11/82  
 Fin: 12/11/82

COTA: Terreno natural



Pozo N° 2

Profundidad	Espesor Capa	Nivel Agua	Perfil Geológico	DESCRIPCION DEL MATERIAL	Humedad Natural %	Límite Líquido %	Índice de Plasticidad P	N° golpes / 30 cm	Clasificación U.S.C.S.	Fotografía Admitida (kg/cm2)
0.25	0.25			Materia orgánica						
1.1	0.85			Arcilla rojiza, muy plástica, medianamente húmeda					CH	0.7
1.6	0.5			Arena limosa, amarillenta grasácea, saturada					SM	0.6
1.8				Arena, color blanquecino amarillento, grano medio saturada					SM SP	0.5
3.4				Arena limosa, blanquecina amarillenta, gr. fino a med.					SM	1.4
4.0	0.6			Arena, color gris blanquecino medianamente compacta, grano medio, saturada					SM SP	1.5
6.7	2.7									1.0
7.3	0.6			Limo arenoso-arcilloso, gris oscuro, baja plasticidad					ML	1.7
8.0										2.0

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mecanica de suelos  
fundaciones.

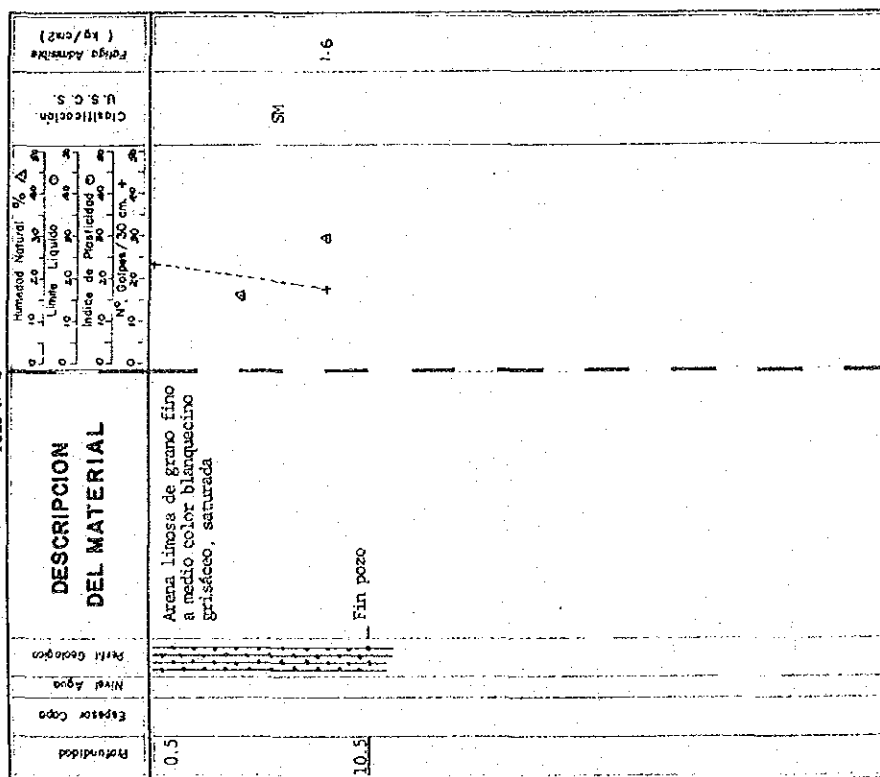
DPTO. LABORATORIO DE SUELOS

PERFIL GEOTECNICO DE SONDAJE

PROYECTO: HOSPITAL SANTA CRUZ UBICACION: Tercer anillo oeste  
Inicio: 11/11/82  
Fin: 12/11/82

COTA: Terreno natural  
I 1.20  
N.A. +2.24 hrs. F. 0.65

Pozo N° 2



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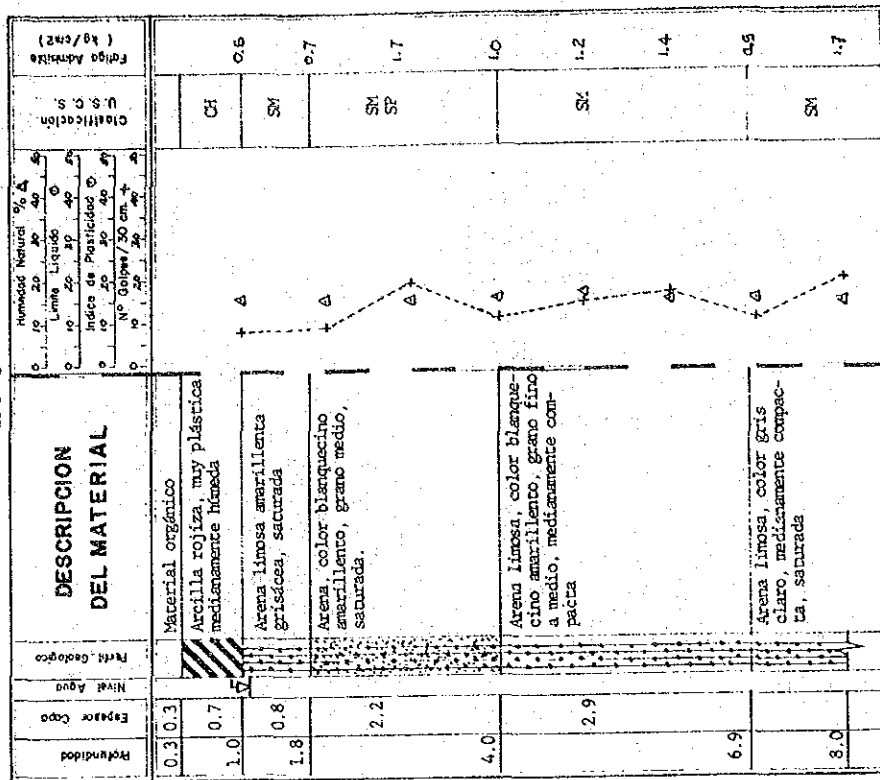
DPTO. LABORATORIO DE SUELOS

PERFIL GEOTECNICO DE SONDAJE

PROYECTO: HOSPITAL SANTA CRUZ UBICACION: Tercer anillo oeste  
Inicio: 13/11/82  
Fin: 14/11/82

COTA: Terreno natural  
I 1.20  
N.A. +2.24 hrs. F. 0.86

Pozo N° 3



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PERFIL GEOTECNICO DE SONDAJE

PROYECTO: HOSPITAL SANTA CRUZ

UBICACION: Tercer anillo oeste

FECHA: Inicio: 13/11/82  
 Fin: 14/11/82

COTA: Terreno natural

N.A. +2.4 hns. F. 0.86  
 I. 1.20

Pozo N° 3

Profundidad	Espesor Cipo	Nivel Agua	Perfil Geológico	DESCRIPCION DEL MATERIAL	Clasificación U.S.C.S.	Porcentaje de Agua (kg/cm2)
0.0				Arena limosa, color blanquecino, medianamente compacta, grano fino a medio, saturada	SM	2.0
11.0	2.0			Arena limosa, blanquecina grisácea, compacta, grano medio a fino	SM	1.9
13.0	2.0			Arena, blanquecina grisácea, compacta, grano medio, saturada	SM SP	1.9
15.5						

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 Ingeniero  
 Mecánico de Suelos  
 Fundaciones

DPTO. LABORATORIO DE SUELOS

PERFIL GEOTECNICO DE SONDAJE

PROYECTO: HOSPITAL SANTA CRUZ

UBICACION: Tercer anillo oeste

FECHA: Inicio: 09/11/82  
 Fin: 10/11/82

COTA: Terreno natural

N.A. +2.9 hns. F. 0.65  
 I. 0.95

Pozo N° 4

Profundidad	Espesor Cipo	Nivel Agua	Perfil Geológico	DESCRIPCION DEL MATERIAL	Clasificación U.S.C.S.	Porcentaje de Agua (kg/cm2)
0.2	0.2			Material orgánico		
0.75	0.75			Arcilla limosa, color gris oscuro, plasticidad media	CL	0.4
2.65	2.65			Arena, de grano medio color gris blanquecino, saturada	SM SP	0.9
3.6						0.4
4.75	1.05			Arena limosa, amarillenta grisácea, grano fino a medio, saturada	SM	1.4
6.25	1.5			Arena de grano medio, medianamente compacta, color gris blanquecino	SM SP	1.5
7.5				Arcilla limo-arenosa, gris oscuro, baja plasticidad	CL ML	0.9
					SM SP	

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**PERFIL GEOTECNICO DE SONDAJE**

PROYECTO: HOSPITAL SANTA CRUZ  
UBICACION: Tercer anillo oeste  
FECHA: Inicio: 09/11/82  
Fin: 10/11/82  
COTA: Terreno natural

N.A. I - 0.95  
+ 2.4 hrs. F - 0.65

Profundidad	Espesor Capa	Nivel Agua	Perfil Geológico	DESCRIPCION DEL MATERIAL	Humedad Natural % Δ	Clasificación U.S.C.S.	Peso Admisible (kg/cm <sup>2</sup> )
8.45				Arena, grano medio, compacta color gris blanquecino Fin Pozo * Limo arcilloso, gris claro	64	SM SP	1.7

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**PERFIL GEOTECNICO DE SONDAJE**

PROYECTO: HOSPITAL SANTA CRUZ  
UBICACION: Tercer anillo oeste  
FECHA: Inicio: 11/11/82  
Fin: 11/11/82  
COTA: Terreno natural

N.A. I - 0.80  
+ 2.4 hrs. F - 0.65

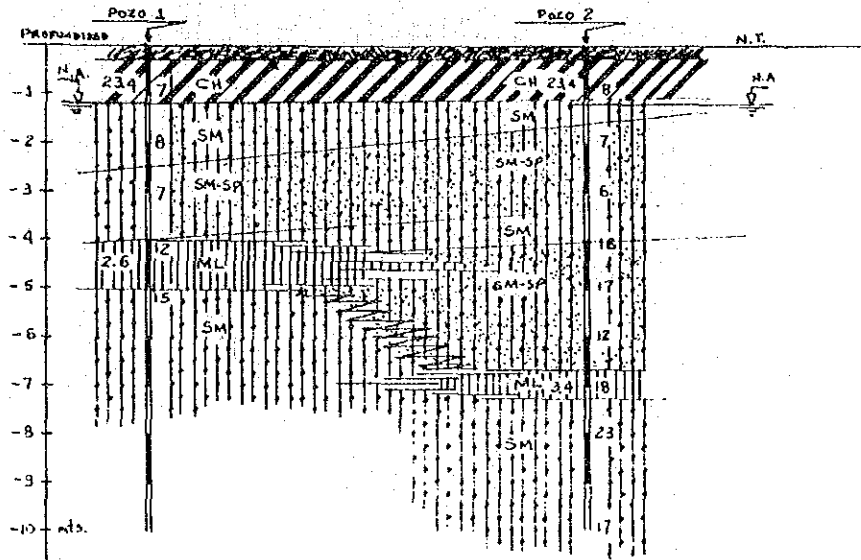
Profundidad	Espesor Capa	Nivel Agua	Perfil Geológico	DESCRIPCION DEL MATERIAL	Humedad Natural % Δ	Clasificación U.S.C.S.	Peso Admisible (kg/cm <sup>2</sup> )
0.2	0.2			Materia orgánica arcilla limosa, gris obscuro plasticidad media		CL	0.4
0.7	0.5			Arena limosa, color gris amarillento, medianamente compacta, saturada, grano fino a medio		SM	1.4
3.4							1.2
4.1	0.2			Arcilla limosa, gris obscuro		CL - ML	0.9
4.3				Arena limosa, blanquecina amarillenta, grano fino a medio, medianamente compacta		SM	1.6
5.45				Fin Pozo			



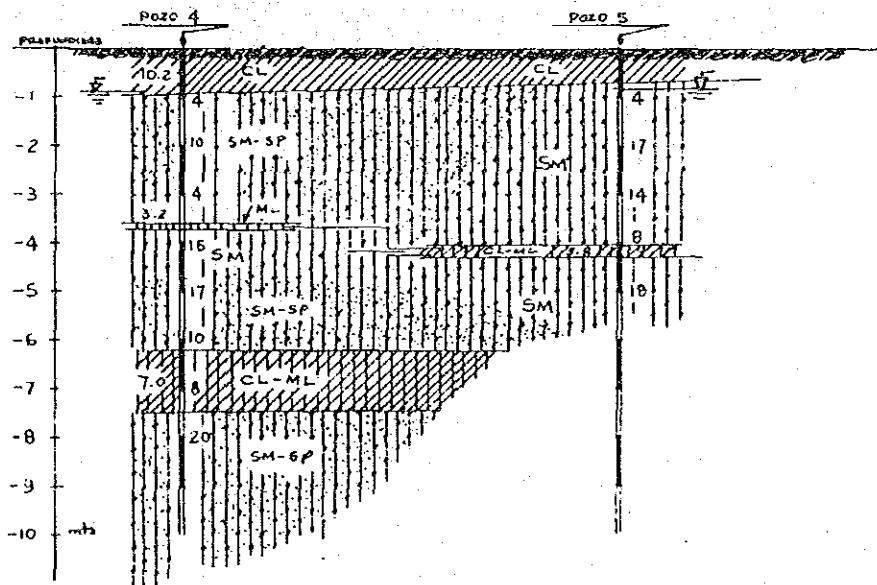




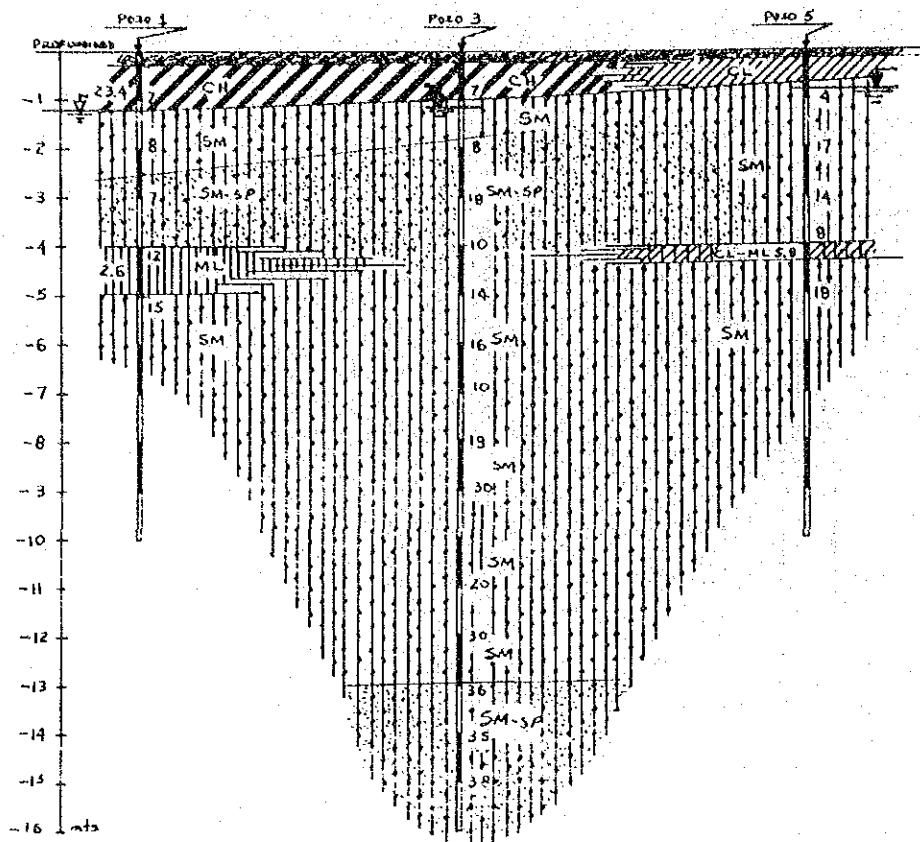
PERFIL DE CORRELACION A-A'



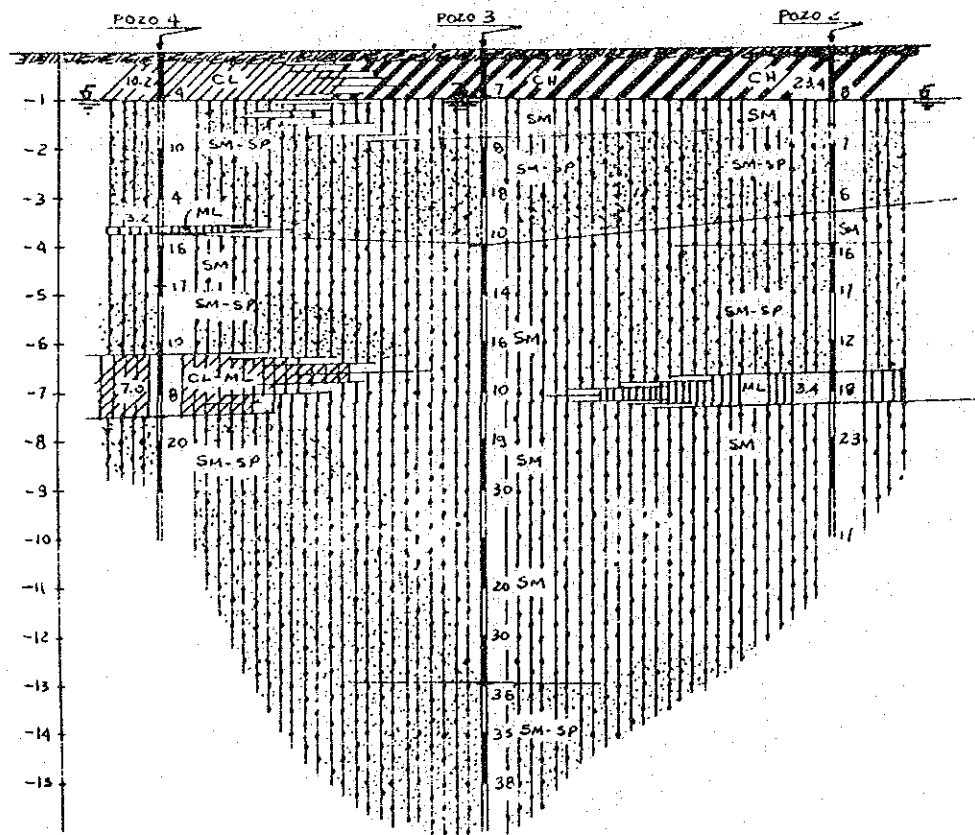
PERFIL DE CORRELACION B-B'



PERFIL DE CORRELACION C-C'



PERFIL DE CORRELACION D-D'



16. Water Quality Analysis (Santa Cruz Municipal Water Supply)

PH.		7.25
Color, turbidity.		0.0
Chlorine.	(Cl)	1.0
Copper.	(Cu)	0.0
Iron.	(Fe)	0.0
Manganese.	(Mn)	0.0
Fluorine.	(F)	0.6
Alkalinity.	(CO <sub>3</sub> Ca)	160.0
Calcium hardness.	(CaCO <sub>3</sub> )	154.0
Magnesium.	(Mg)	3.4
Calcium.	(Ca)	61.6
Total hardness.		168.0
Sulfate.	(SO <sub>4</sub> )	17.0
Phosphate.	(PO <sub>4</sub> )	0.7
Total residue.		260.0

17. Energy and Other Charges

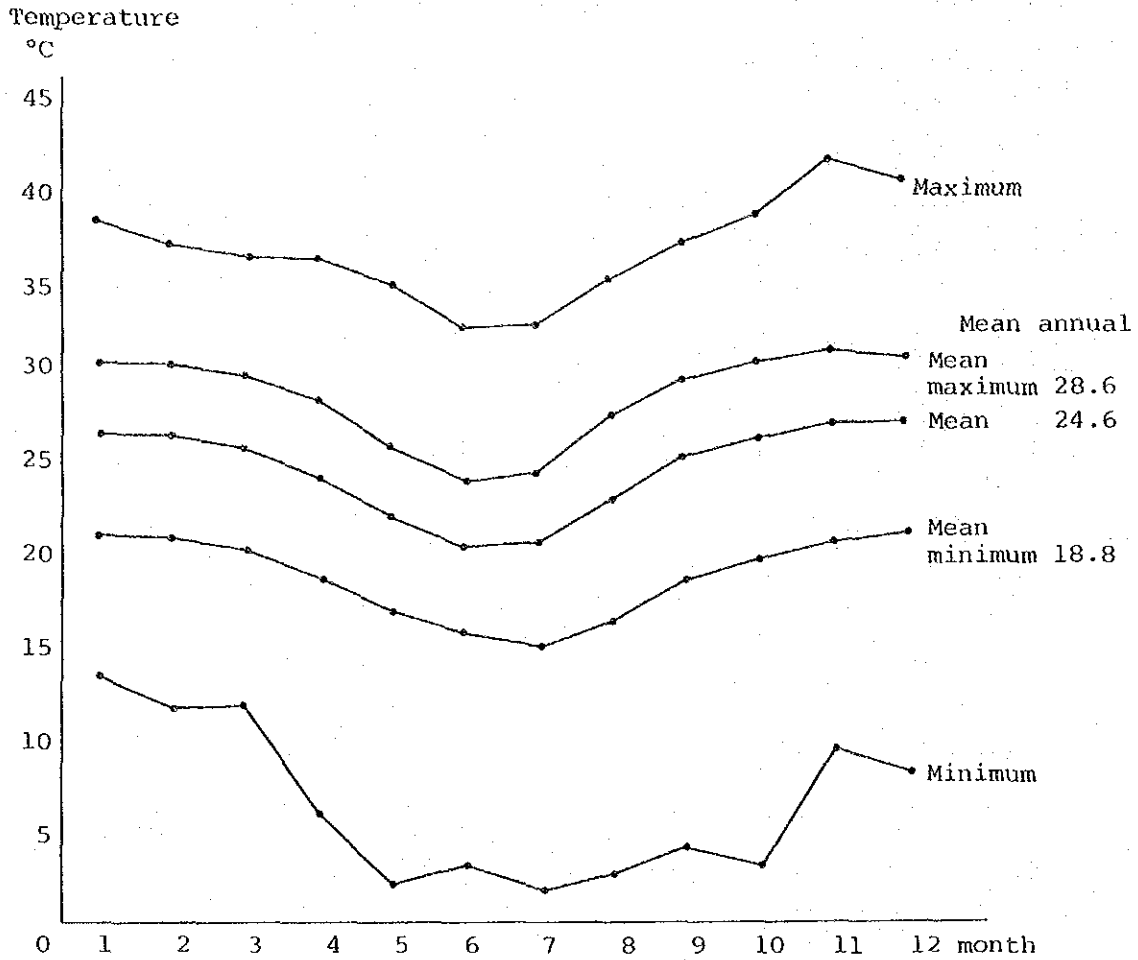
Electric power	a.	No basic charge	
	b.	Rent 3.52 pesos/kWh + electricity tax 12.2%	
Telephone	a.	Institution charge US\$810 circuit	
	b.	Basic telephone call charge (monthly amount) up to 60 calls US\$2.4	
	c.	Usage charge (monthly amount) from 61 calls 0.67 pesos/call	
Oil, Gas	a.	Gasoline	25 pesos/l
	b.	Diesel oil	23 pesos/l
	c.	Kerosene	22 pesos/l
	d.	Petroleum	8 pesos/l
	e.	Propane gas	5 pesos/l
	f.	Natural gas	7 pesos/l
Water	a.	First 10 m <sup>3</sup>	52.5 pesos/10 m <sup>3</sup>
	b.	Next 100 m <sup>3</sup>	2.0 pesos/m <sup>3</sup>
	c.	Above 101 m <sup>3</sup>	7.5 pesos/m <sup>3</sup>
Sewerage	a.	First 10 m <sup>3</sup>	78.4 pesos/m <sup>3</sup>
	b.	Next 100 m <sup>3</sup>	1.6 pesos/m <sup>3</sup>
	c.	Above 101 m <sup>3</sup>	6.0 pesos/m <sup>3</sup>

18. Meteorological Data

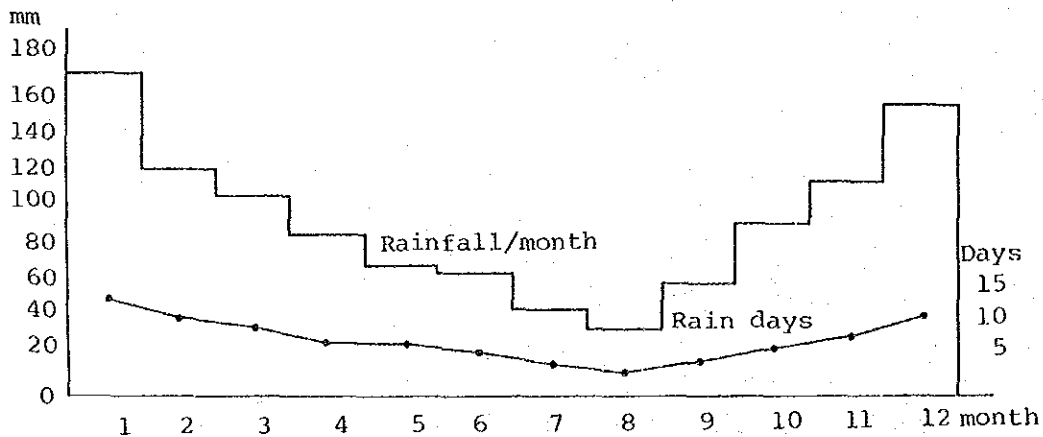
(1) Meteorological Data for Santa Cruz City (1943~1979)

	Jan.	Feb.	Mar.	Apr.	Mar	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Average
Average maximum temperature (°C)	30.4	30.5	30.0	28.6	26.0	24.1	24.6	27.6	29.6	30.4	31.2	30.8	28.6
Average temperature (°C)	26.6	26.6	26.0	24.3	22.1	20.4	20.6	22.9	25.3	26.2	27.0	27.0	24.6
Average minimum temperature (°C)	21.2	21.2	20.5	18.7	17.1	15.8	15.2	16.3	18.4	19.7	20.5	21.0	18.8
Maximum temperature (°C)	38.1	37.2	36.4	36.3	35.0	32.3	32.5	35.0	37.0	38.4	41.6	40.5	-
Minimum temperature (°C)	13.3	11.8	12.0	6.1	2.1	3.2	1.8	2.5	4.0	3.0	9.3	8.0	-
Monthly rainfall (mm)	176	125	112	91	73	70	49	39	63	94	117	159	Total 1170
Monthly rainfall (days)	13	11	10	8	8	7	5	4	5	7	8	11	Total 96
Average humidity (%)	74	74	73	72	75	75	68	59	59	62	64	69	69
Average pressure (mb)	991	991	966	930	932	933	934	932	930	928	965	962	950
Prevailing wind direction	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW
Average wind velocity (knot)	9	9	8	8	9	10	11	11	10	9	9	9	9
Average wind velocity (m/sec.)	4.6	4.6	4.1	4.1	4.6	5.1	5.6	5.6	5.6	5.1	4.6	4.6	4.6

2) Monthly atmospheric temperatures (1943~1979)

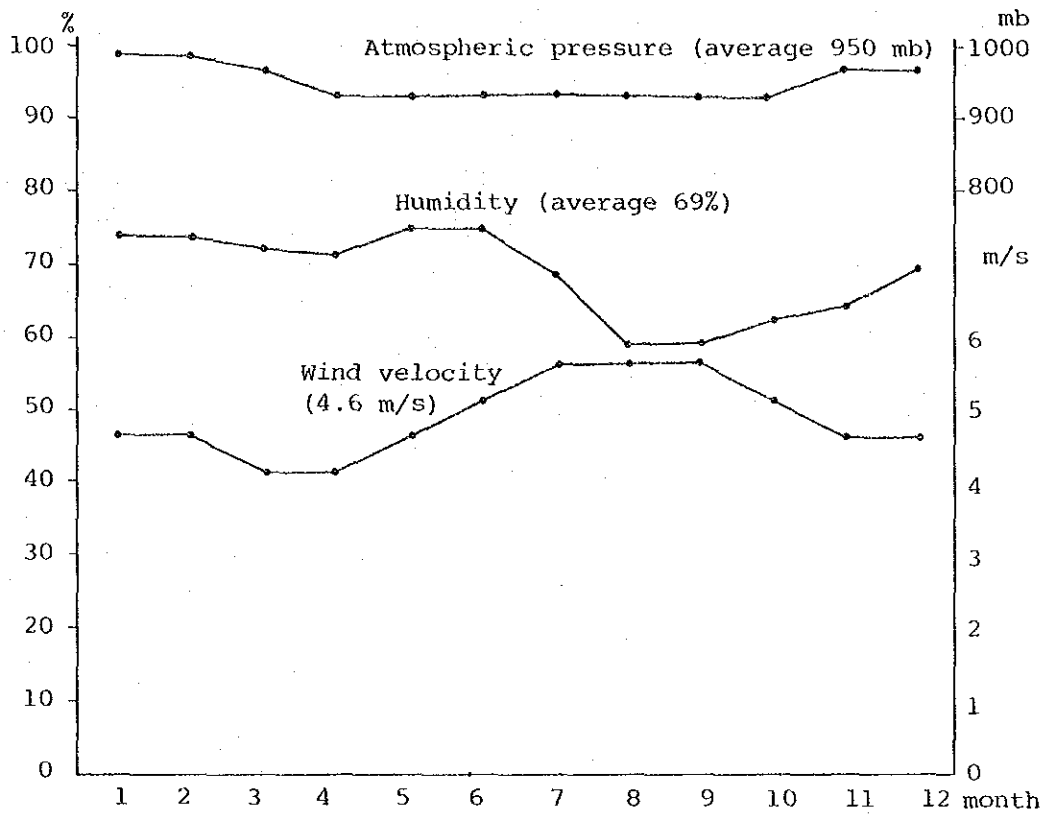


3) Monthly average rainfall and rain days (1943~1979)



Note: Average annual rainfall: 1170 mm  
Average annual rain days: 96 days

4) Monthly average atmospheric pressure, humidity and wind velocity (1943 ~ 1979)



Note: Prevailing wind direction is NW  
(SE for June - August).



19. Construction Cost Data

1) Construction Material Prices

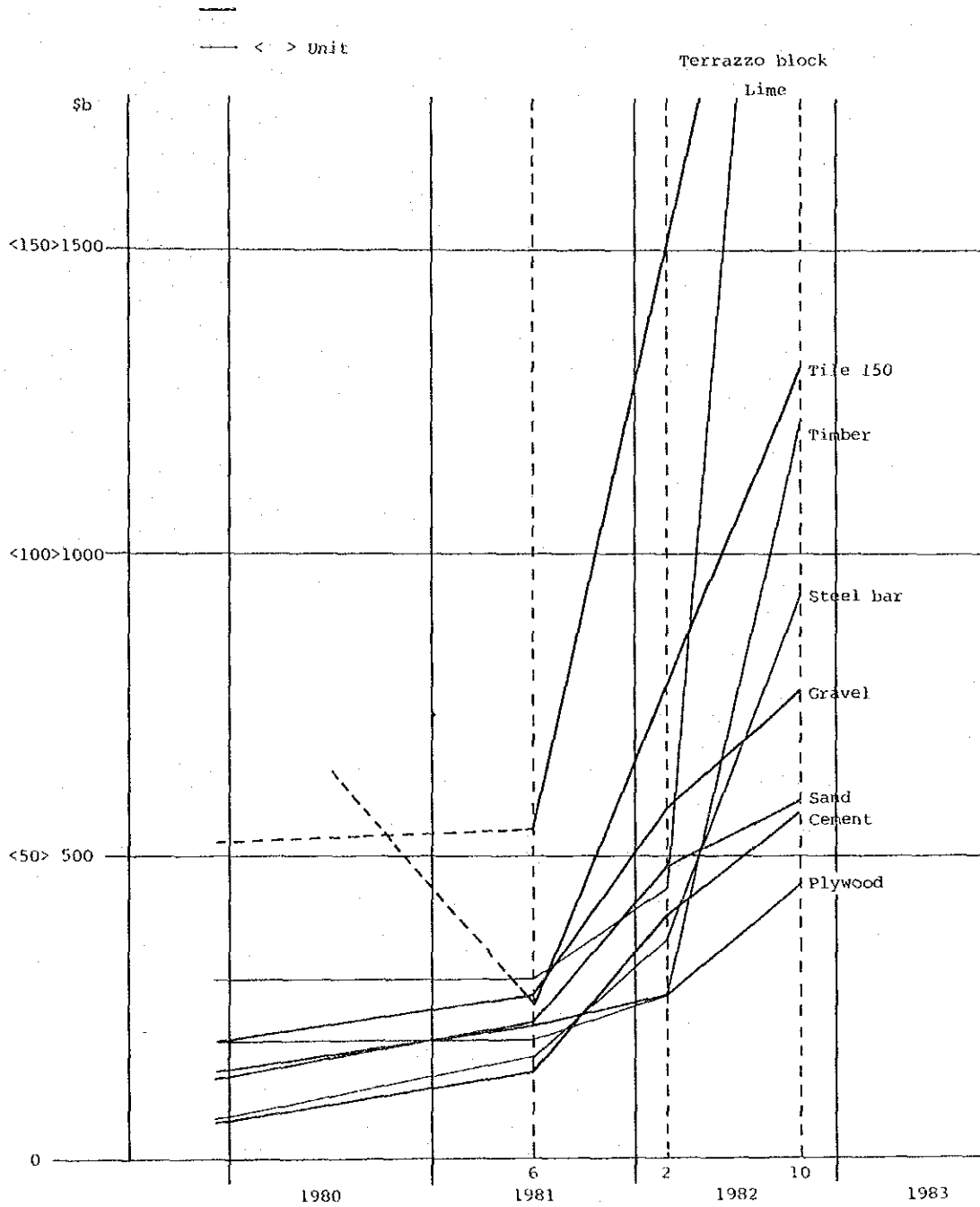
a) Main construction materials

Below is a list of prices of main construction materials in Santa Cruz.

Unit: \$b

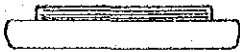


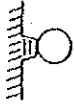
Item	Unit	Mid-1981	1982.2	1982.10	1983.2
Steel bar	kg	17	36	92	265~275
Cement	50kg	150	408	575	1150~1250
Sand	m <sup>3</sup>	225	480	591	900~1000
Gravel	m <sup>3</sup>	275	588	775	1700
Lime	50kg	30	45	300	415
Timber (mara)	p <sup>2</sup>	20	27	120	300~450
Plywood	m <sup>2</sup>	230	270	470	518
Terrazzo block	m <sup>2</sup>	500~600	-	2700	4000
Brick (6-hole)		5.47	-	9.5	16.1
Brick (8-hole)		5.09		12.0	20.3
Tile 150° (white)	m <sup>2</sup>	260	-	1298	4750

# Construction Material Prices



b) Materials for Electrical Fittings

As of November 1982

Materials	(Materiales)	Unit Price (peso)
1) Lighting equipment		(Arterfactos de iluminacion)
 Acrylic cover (rectangle)	20W × 1	4.500
	20W × 2	7.700
	40W × 1	8.600
	40W × 2	11.400
 Trough type	20W × 1	2.000
	20W × 2	3.600
	40W × 1	3.900
	40W × 2	5.900
 Reflecting shade type	20W × 1	2.500
	20W × 2	4.100
	40W × 1	4.700
	40W × 2	6.200
 Incandescent light with glove	60W × 1	2.300
	75W × 1	2.600
	100W × 1	3.450
Fluorescent tube	20W	450
	40W	500
Electric bulb	40W	150
	75W	160
	100W	170

Materials	Unit price (peso)
2) Switches and wall sockets (Interruptor y tamacorriente)	
Recessed type with acrylic plate	Switch x 1 240
	" x 2 " 350
	" x 3 " 460
	Switchx1 + Socketx1 " 350
	" x2+ " x1 " 460
	" x1+ " x2 " 460
	Wall socketx1 " 240
	" x2 " 350
	" x3 " 460
	Nozzle plate for telephone " 250
Knife switch with cover	2p 20A 650
	2p 30A " 900
	2p 60A " 1.800
	2p 150A " 4.600
	3p 20A " 1.200
	3p 30A " 2.300
	3p 60A " 4.700
	3p 100A " 6.800
3p 200A " 20.400	
Outlet box	Vinyl square 50
	Vinyl hexagonal " 95
	Metal 4" x 4" " 200
	" 5" x 5" " 290

Materials		Unit price (peso)
3) Electrical cable	CABLE	
Single-core flex	18 AGW	25/m
	16 "	30
	14 "	38
	12 "	58
	10 "	88
	8 "	135
Twin-core flex	16 AGW	45/m
	14 "	100
	12 "	128
	10 "	160
4) Electrical conduits	TUBO	
PVC conduits	1/2 inch × 3 m	200 ea.
	5/8 " × 3 m	270
	3/4 " × 3 m	290
	1 " × 3 m	340
	2 " × 3 m	1,100
	3 " × 3 m	1,870
	4 " × 3 m	2,550
5) Other		
	Plug	100
	Battery-operated clock	15,000~17,000
	Lightning rod	14,000
	TV antenna	4,500
	Color TV 14 inch	120,000
	" 19 inch	157,000
	Washing machine	187,000

C) Water Supply, Drainage and Air Conditioning

US\$1 = 200 pesos = ¥250

Item	Description	Unit	Bolivian prices		Japanese prices (yen)	Remarks
			Peso basis	Yen basis		
Water pipe	Zinc-plated steel pipe 3/4"	1 m	420	525	246	
"	" 2"	1 m	1.400	1.750	723	
Drain pipe	Vinyl chloride pipe 2"	1 m	400	500	129	
"	" 4"	1 m	950	1.188	398	
Valve	Gate valve 3/4"	(one)	780	975	720	Bronze Manufactures' specifications
"	" 2"	(one)	3,000	3.750	2.050	
"	" 4"	(one)	7.200	9.000	13.700	Cast iron JIS 5k
Bowl	with low tank	(1 set)	17.000	21.250	38.720	
Wash basin	with 2 taps	(one)	10.300	12.875	13.120	
Double sink	Stainless 900 x 550 x 550 work top only	(one)	21.000	26.250	36.000	
Evaporative cooler	9000 BTU	(one)	190.000	237.500	99.000	
"	12.000 BTU	(one)	205.900	257.400	129.000	

(2) Labor Costs

a) Wages

Below are the average wages of construction workers.

Unit: \$b

	1981.8	1982.8	1982.11
Foreman	200	400	630
1st-class finisher	180	360	565
2nd-class finisher	150	300	470
Mason (bricklayer)	125	250	400
Frame carpenter	125	250	400
Skilled assistant	108	220	340
Semi-skilled assistant	100	200	315
Skilled hand	95	190	300
Semi-skilled hand	90	180	280

The above figures are daily wages only. If the work continues over a long period, the employer must bear the social insurance premium. A bonus equivalent to one month's wages is paid twice a year. When the bonus and the social insurance premium are included, the personnel costs increase by 50~80%. Wage rates are raised by cabinet orders. In 1982, wages increased by 98% in February and by 57% in November.

b) Work Efficiency

According to data compiled by the Bolivian Ministry of Urban Housing, the work efficiency of construction workers in different trades is as shown below.

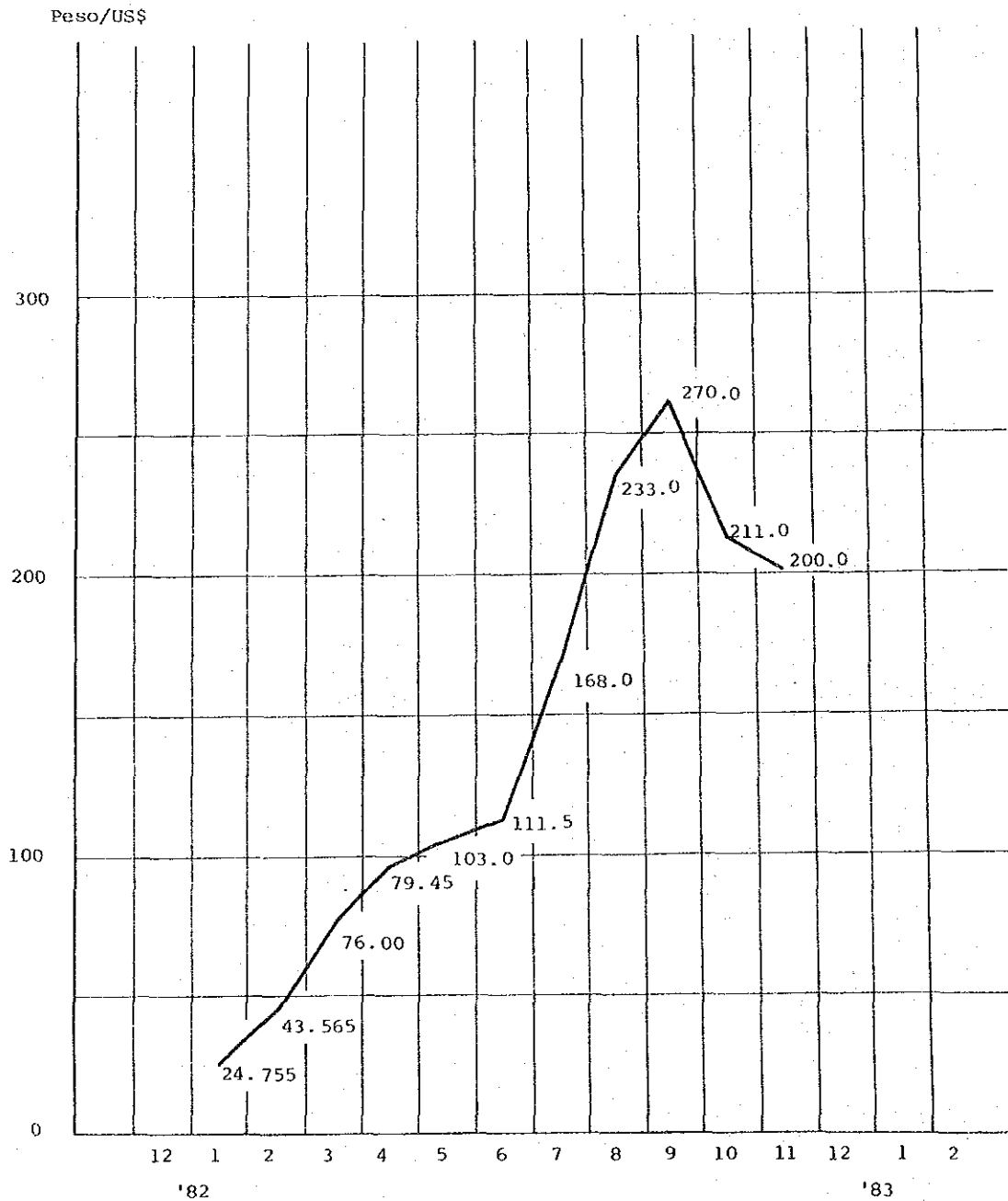
Earth work	1 assistant	Per 1 m <sup>3</sup>	2.5 hr.	(soil of medium hardness)
Concrete work	Skilled worker and 1 assistant	1 m <sup>3</sup>	0.3 hr.	
Steel bar work	"	1 m <sup>3</sup> (80 kg)	4 hr.	
Form molding	"	70 m <sup>3</sup> for concrete	1 day	
Bricklaying	"	1 m <sup>2</sup>	2.2 ~ 2.9 hr.	(12 cm thick)
Bricklaying	"	1 m <sup>2</sup>	3.4 ~ 4.1 hr.	(25 cm thick)
Hollow brick laying	"	1 m <sup>2</sup>	2.3 ~ 2.5 hr.	(18 cm thick)
Hollow brick laying	"	1 m <sup>2</sup>	2.5 ~ 2.7 hr.	(25 cm thick)
Asphalt water proofing	"	1 m <sup>2</sup>	5 hr.	
Mortar work	"	1 m <sup>2</sup>	0.5 hr.	
Terrazzo block flooring	"	1 m <sup>2</sup>	3 hr.	
Parquet flooring	"	1 m <sup>2</sup>	3 ~ 3.1 hr.	
Painting	"	1 m <sup>2</sup>	0.15 hr.	
External wall finishing	"	1 m <sup>2</sup>	1.6 ~ 1.8 hr.	(Cal y Cemento)
Internal wall finishing	"	1 m <sup>2</sup>	1 hr.	(Yeso)
Glass fitting	"	1 m <sup>2</sup>	0.2 hr.	(Window glass)

This is only usable as a guide: actual times vary considerably.  
The working day is normally 8 hours long.



20. Changes in the Exchange Rate

1. Bolivian peso/US dollar exchange rate.



## 21. Data on Transportation

### (1) Transportation in General

As mentioned previously, Bolivia is dependent on imports for most important construction materials. Only brick tiles, wood products and terrazzo blocks are produced in Santa Cruz. Those produced elsewhere in the country also have to be transported. Accordingly, the routes for transporting construction materials are extremely important.

### (2) Domestic Transportation

The roads from Bolivia's major cities, La Paz, Cochabamba and Sucre, are entirely paved, making transportation possible in all seasons.

### (3) Railway Transportation from Brazil and Argentina

Santa Cruz is linked with Santos, Brazil, through Corumba. Another line runs to Buenos Aires through Yacuiba. These lines are used to transport goods from the two countries. However, trains do not run regularly but when goods reach a certain volume. Transportation time is around two weeks.

### (4) Transportation costs

La Paz - Santa Cruz	935 km	Truck	24 hr.	US\$ 3.50/ton or m <sup>3</sup>
Sucre - Santa Cruz	610	"	15 hr.	US\$ 3.35
Cochabamba - Santa Cruz	497	"	12 hr.	US\$ 2.50
Arica (Chile) - Santa Cruz	1381	"	1 month	125.50
Matarani (Peru) - Santa Cruz	1705	"	1 month	142.81
Corumba (Brazil) - Santa Cruz	980	Railway	14 days	85.10
Yacuiba (Argentina) - Santa Cruz	775	"	14 days	76.81

(5) Transportation from Japan

Building materials will be largely supplied from major cities in Bolivia. This section considers the transportation of equipment and other materials from Japan.

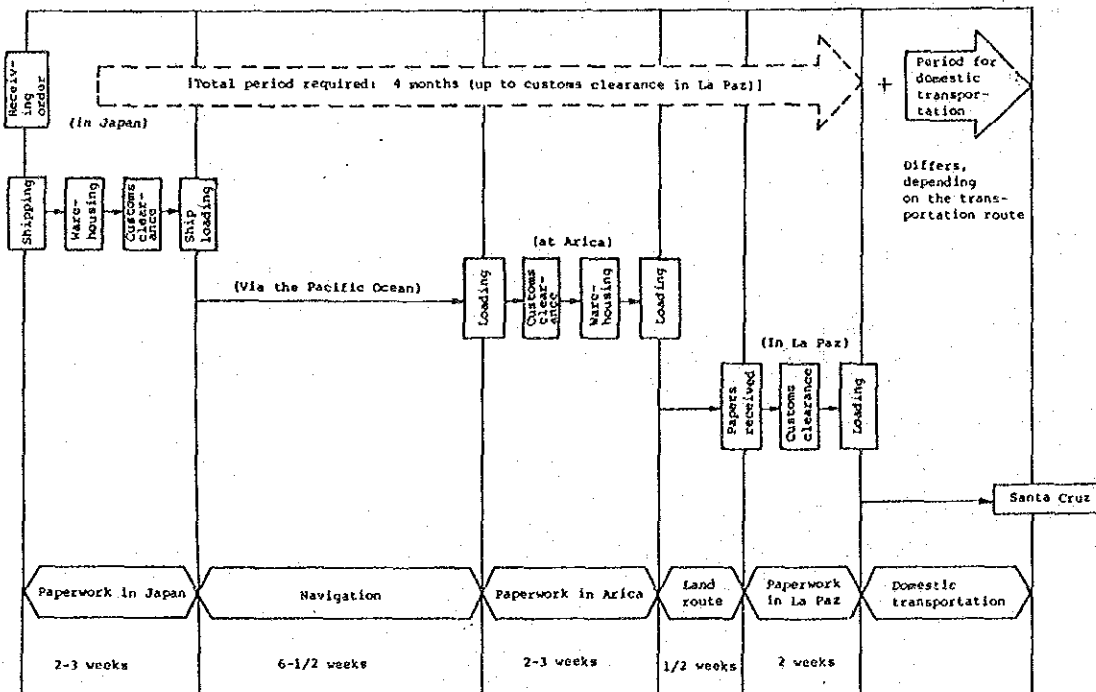
a) Transportation method and route

Building materials will be transported from Japan by ship (air freight could be used but is extremely expensive).

Bolivia is an inland country in the South American continent and does not have a port on the Pacific coast. As for port facilities for transportation to La Paz, three ports may be used: Arica and Antofogasta (Chile), and Matarani (Peru). Of these, Arica is the closest and is therefore the most practical landing port. Materials and equipment will be transported from Arica to La Paz either by rail or by truck. 10-ton trucks will largely be used: larger trucks are said to be unusable on Bolivian roads.

b) Transportation period

It will take at least four months from the placing of an order with Japan for products to clear customs in La Paz. The times required for each stage from the placing of orders to local delivery, and the transportation times, are shown below.





## 22. References

	Name of Publication	Author(s)	Remarks
1	BOLIVIA EN CIFRAS 1980	INSTITUTO NACIONAL DE ESTADISTICA	
2	RESULTADOS DEL CENSO NACIONAL DE POBLACION Y VIVIENDA 1976 DEPARTAMENTO DE SANTA CRUZ	(ditto)	
3	RESUMEN ESTADISTICO 1980	(ditto)	
4	BOLETIN DEMOGRAFICO DEPARTAMENTAL DE SANTA CRUZ	(ditto)	
5	ESTADISTICAS DE TRANSPORTES Y COMUNICACIONES 1975 - 1979	(ditto)	
6	LA POBLACION BOLIVIANA EN GRAFICOS 1980	(ditto)	
7	ESTIMACIONES DE LA POBLACION POR DEPARTAMENTOS Y CIUDADES CAPITALES 1980 - 1990	(ditto)	
8	INDICE DE PRECIOS AL CONSUMIDOR 1982 - 8	(ditto)	
9	ESTRUCTURA DE LA MORTALIDAD DEL DEPARTAMENTO POR CAUSAS Y GROUPS DE EDAD SANTA CRUZ BOLIVIA 1981	MINISTERIO DE PREVISION SOCIAL Y SALUD PUBLICA UNIDAD SANITARIA	
10	ESTADISTRICAS DE SALUD DEL SECTOR PUBLICO 1976 - 1978	INSTITUTO NACIONAL DE ESTADISTICA	

	Name of Publication	Author(s)	Remarks
11	SALUD PUBLICA BOLIVIANA 1981, JUNIO	ORGANO DE LA SOCIEDAD BOLIVIANA DE SALUD PUBLICA	
12	BOLETIN INFORMATIVO DEL CENETROP	MINISTERIO DE PREVISION SOCIAL Y SALUD PUBLIC	
13	COMPENDIO DE DATOS METEOROLOGICOS DEL DEPARTAMENTO DE SANTA CRUZ	CORPORACION REGIONAL DE DESARROLLO DE SANTA CRUZ	METEOROLOGICAL DATA
14	ANUARIO METEOROLOGICO DE SANTA CRUZ 1980	(ditto)	
15	PLAN OPERATIVO 1982	MINISTERIO DE PREVISION SOCIAL Y SALUD PUBLICA UNIDAD SANITARIA SANTA CRUZ	
16	[Medical Data]	(ditto)	
17	INFORME ESTADISTICO MENSUAL 1982 (C.P.S.S.)	HOSPITAL SANTA CRUZ C.P.S.S.	Petroleum Corporation Hospital C.P.S.S. Medical Statistics







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