トンガ・日本/WHO
合同保健衛生検査所プロジェクト
実施設計調査報告書

昭和57年 5 月

国際協力事業団

トンガ・日本/WHO
合同保健衛生検査所プロジェクト
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昭和57年5月

国際協力事業団

はじめに

トンガ・日本／ＷＨＯ合同保健衛生検査所プロジェクトは，トンガの保健医療における検査室機能を充実。整備して疾病対策及びプライマリー・ヘルスケアーに寄与することを目的とし，具体的には現在バイオラ病院にある検査所機能を拡充するのみならず，国家的要請の高まっている公衆・環境衛生検査に対応しうる機能をこれに附加し，トンガの総合的な中央検査機能を確立しようとするものであり，昭和５６年１２月１５日に討議議事録が署名され，５年間に亘る協力事業を開始した。

トンガ政府は上記討議議事録にもとづき検査所施設の拡充・整備について，日本側に協力を要請してきた。

当事業団は同要請に対して実施設計調査団を昭和５７年３月２９日から同年４月７日まで現地に派遣した。

現地においては，サイクロンによる甚大な被害の直后にもかかわらず，トンガ政府関係者の全面的協力を得て，調査は順調に行われた。帰国後，現地調査の結果を踏まえ，各種の検討解析作業を行い，ここに本報告書提出の運びとなったものである。

本報告書が，本プロジェクトの推進に寄与することを願うと共に，本件調査団各位ならびに調査団の派遣にご協力を賜った関係諸機関の各位に，深甚なる感謝の意を表する次第である。

国際協力事業団

理事　　長谷川　正　男

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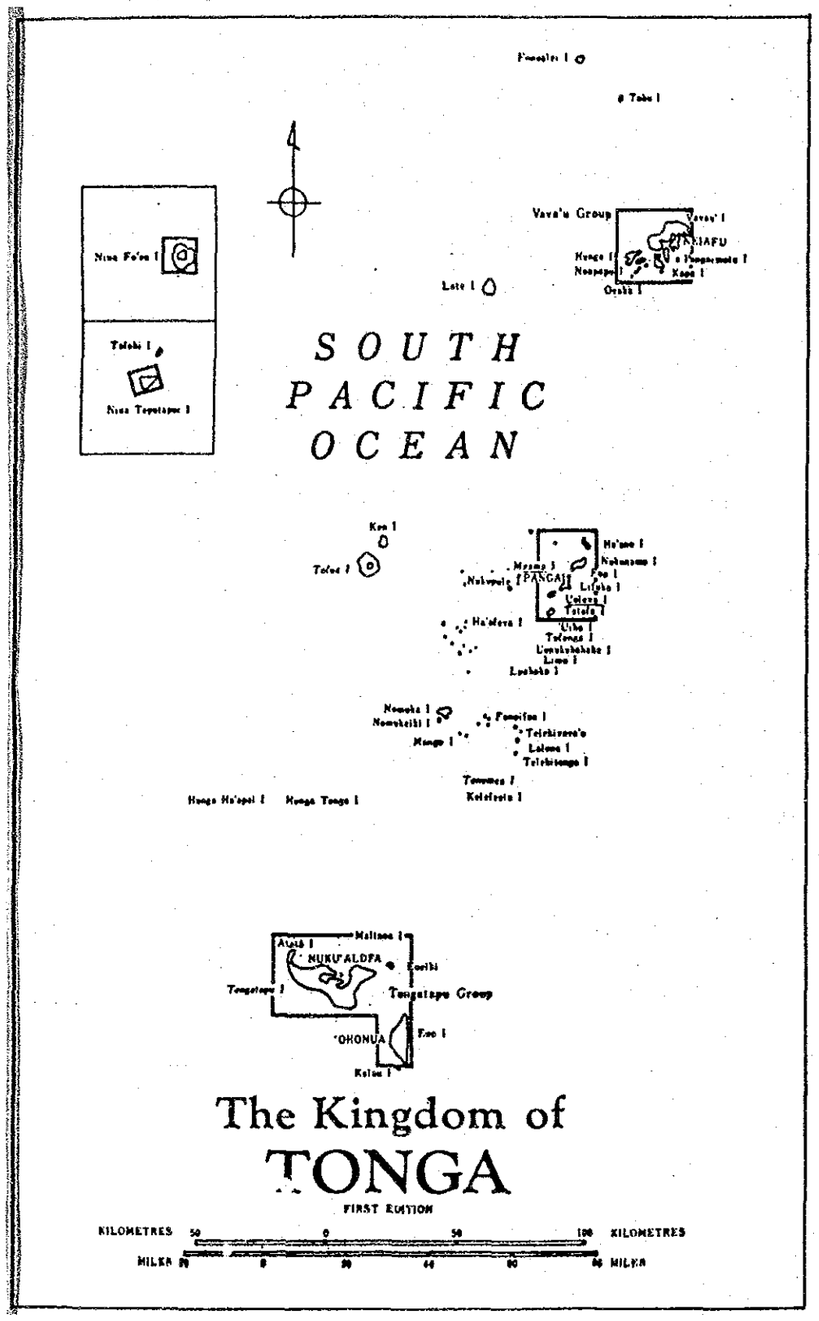
SOUTH
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Vava'u Group
Late I
Kao I
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Mango I
Tongatapu Group
'OHONUA
Kelefesia I
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Hunga Tonga I
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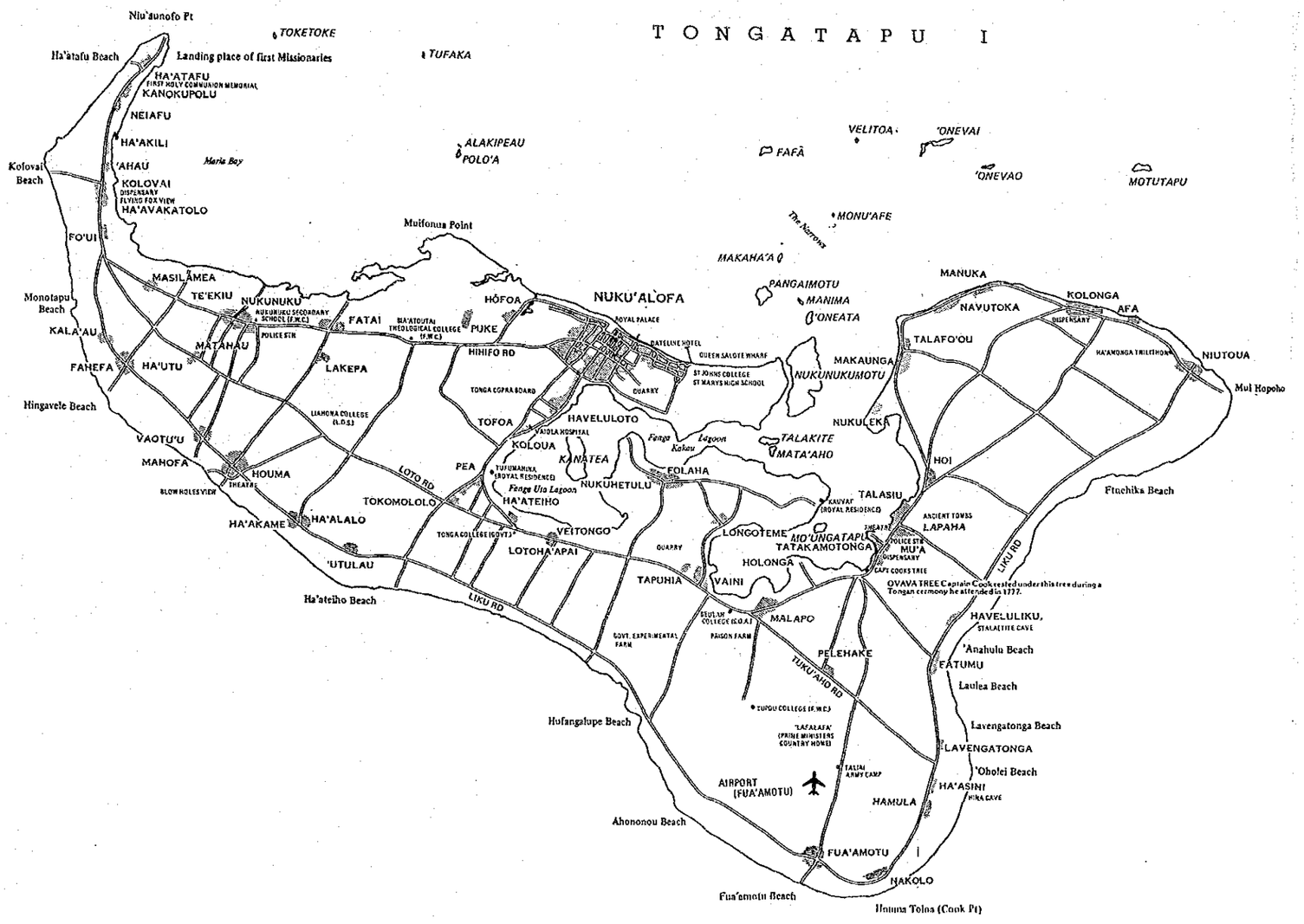
TONGA
FIRST EDITION
KILOMETRES
MILES
KILOMETRES
MILES


TONGATAPU I
Niu'aunofo Pt
Ha'atafu Beach
Landing place of first Missionaries
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Muifonua Point
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Monotapu Beach
KALA'AU
FAHEFA
HA'UTU
MATAHAU
FATAI
LAKEPA
HOFOA
PUKE
HIHIFO RD
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DATELINE HOTEL
QUEEN SALOTE WHARF
ST JOHNS COLLEGE
ST MARYS HIGH SCHOOL
QUARRY
Hingavele Beach
TONGA COPRA BOARD
TOFOA
HAVELULOTO
VAIOLA HOSPITAL
KOLOUA
KANATEA
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FOLAHA
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Ha'atelho Beach
TONGA COLLEGE (GOVT.)
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KAUVAI (ROYAL RESIDENCE)
THEATRE
POLICE STN
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OVAVA TREE Captain Cook seated under this tree during a Tongan ceremony he attended in 1777.
LIKU RD
ANCIENT TOMBS
LAPAHA
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HOI
Ftuchiks Beach
VELITOA
'ONEVAI
FAFA
'ONEVAO
MOTUTAPU
MONU'AFE
The Narrows
MAKAHA'A
PANGAIMOTU
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MANUKA
NAVUTOKA
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TALIAI ARMY CAMP
AIRPORT (FUA'AMOTU)
HAMULA
Hufangalupe Beach
Ahononou Beach
FUA'AMOTU
NAKOLO
Fua'amotu Beach
Houma Tolua (Cook Pt)

調査団構成

団長	海佐裕幸	総括	広島県衛生研究所長
	山本泰次	(単発派遣)伝染病対策	県立広島病院
団員	小塚良雄	建築設計指導	厚生省医務局整備課
	河田俊郎	建築設計	石本建築事務所
	村上弘	医療機器	〃 嘱託
	塚田幸三	業務調整	JICA医療協力部

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Mr. M. Ramos (Manager, Tonga Water Board)

Mr. D. M'Knight (Mechanical Superintendent; Ministry of works)

Mr. B. Hodgkinson (Government Architect, Ministry of works)

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Dr. N. U. Rao (Microbiologist, Suba)

Dr. L. R. L. V. Verstuyft (Programma Coordinator, Suva)

Dr. T. Olakowski (Epidemiologist, Suva)

JICA関係者

松本昌弘(専門家)

倉松 (J. O. C. V.)

長坂 (〃)

椿　　（J.O.C.V.）

フィジー大使館関係者　池部大使

宮内書記官

高山　〃

小池　〃

調査日程

月日	曜日		内容
3月29日	月	AM	
		PM	TOKYO 22:10（エンジントラブルで50分遅れ） JL 2775
30日	火	AM	→09:01 NADI
		PM	→13:00 AUCKLAND　Airport Inn 泊
31日	水	AM	
		PM	AUCKLAND 14:07 PH732 → 17:44 TONGATAPU（Mr.Kautoke, Dr.Palmerの出迎え） ○打合せ会議 於 Dateline HTL (Mr.Kautoke, Dr.Palmer)
4月1日	木	AM	○会議 09:30~11:30 於保健省（保健省側－Dr.Foliaki, Mr.Kautoke WHO側－Dr.Palmer, Dr.wang, Dr.Rao） ○視察（・給水設備, ・変電設備, ・排水処理設備, ・検査室）
		PM	○会議 14:00~17:00 於保健省（保健省側－Dr.Foliaki, Mr.Kautoke, Dr.Moala WHO側－Dr.Palmer, Dr.wang, Dr.Rao）
2日	金	AM	○会議 09:30~13:00 於保健省（保健省側－Mr.Kautoke WHO側－Dr.wang, Dr.Rao） ○建築サイトの視察 11:30~12:30（河田, 小塚, 塚田団員）
		PM	○Cyclone被害状況視察（調査団全員, Mr.Kautoke, Dr.Rao／Fisheries, Houma primary school, Monotapu Beach, Kolovai）
3日	土	AM	・書類整理
		PM	
4日	日	AM	・書類整理
		PM	・JOCV隊員・松本専門家との打合せ（塚田団員）

月　日	曜日		内　　容
4月　5日	月	AM	○会議　09：30～12：30　（保健省側－Dr.Foliaki,Mr.Kautoke,Dr.Moala, Mr.Hodgkinson / WHO側－Dr.Palmer,Dr.wang,Dr.Rao） 於保健省
		PM	●昼食会　12：30～ 2：30　（保健省側－Mr.Kautoke, Dr.Moala, Mr.Hodgkinson / WHO側－Dr.Palmer, Dr.Morioka, Dr.wang, Dr.Rao） 於 Dateline HTL FJ 425 TONGATAPU —— SUVA ●日本大使主催晩さん会（公邸） 19：30～22：30（大使・宮内・高山・小池各事務官）
6日	火	AM	●WHOスバ事務所にて打合せ　（海佐団長・塚田団員，WHO－Dr.Verstuyft, Dr.Olakowski,Dr.Raw） ●建設関係事情視察（山本，小塚，河田，村上団員）
		PM	FJ117 SUVA　18：00 ——→ 18：35　NADI
7日	水	AM	JL776 NADI　01：15 ——→ 06：50　TOKYO

A. 基 本 設 計

1. 建築基盤概要

1－1 トンガの位置，面積

トンガ王国は南太平洋上西経173°～177°，南緯15°～23° 30′の広い海域にほゞ南北に浮ぶ170近い島々よりなり，その中に3つの群島がある。つまり南方のトンガタブ群島（ Tongatapu group ），中央のハーパイ群島（ Háapai group ）及び北方のババウ群島（ Vavάu group ）である。

ババウの更に180海哩北方には，ニウァトプタプ（ Niua Toputapu）とニウァフォオウ（ Niua Fóou ）の2島がある。

全島の合計面積は750 km^2 で，トンガタブ群島の主島であるトンガタブ島（ Tongatapu I ）はトンガ最大の島で，面積は260 km^2 となっている。

1－2 地　　勢

地形的には北々東より南々西に西側にトファ隆起（ Tofua Ridge ），中央にトンガ隆起（ Tonga Ridge），東側にトンガ海溝（ Tonga Trench ）がある。中央のトンガ隆起にある島々は大部分が偏平な隆起珊瑚の島で，トンガタブ島の最高地点で標高約82 m，ハーパイ島で約45 m，最も高いババウ島で約213 m である。

西側のトファ隆起は火山帯で，中央の平坦な珊瑚島とは対照的に高く聳え，トファ島（ Tofua Is.）は標高約506 m である。東側のトンガ海溝は深さ約10,882 m，世界有数の海溝として知られている。（図－1 ）

人口の大部分の居住する中央の隆起珊瑚島はコーラル石灰岩の上にシルト粘土質ローム（ Silty－clay Loams），あるいは稠密粘土（ Heavy clays ）が堆積しているが，前者は西側の火山群島に近い方に，後者は東側のトンガ海溝に近い方に堆積している。

トンガタブ島では前者はファヘファ層（ Fahefa Soils ），後者はラパハ層（ Lapaha Soils）と呼ばれ，約1～1.2 m 位の厚みとなっている。地下水は硬質であるが比較的良質の水が得られる。又このローム層は非常に水はけが悪い。

1－3　気　　象

1）気　　候

トンガは南回帰線の北方に位置するため，太陽は年２回真上を通過することになる。太陽が黄道上を北から南へ赤緯をかえ，その赤緯がトンガの緯度と等しくなる時，すなわち１１月下旬頃が第１回目，再び南から北へ移動しはじめて約２ケ月後の１月中旬頃が第２回目で，いわゆる盛夏が２回あるわけである。

１年は２つのシーズンに大別される。１２月～４月が夏で雨期，首都ヌクアロファ（Nukualofa）における平均気温は２５°～２６.２℃，特に１月～３月には月間２５０㎜の降雨量があり正午の相対湿度は７５％に達する。

５月～１１月は冬で乾期，平均気温は２１.７°～２４℃，月間降雨量は１３０㎜以下，その相対湿度は６７％にまで下る。年によっては１０月，１１月は乾ばつを見るが，４～６週間以上続くことは殆んどない。北の諸島では赤道に近くなるためより高湿で降雨量も増す。ニウアトプタプ（Niuatoputapu）では首都ヌクアロファと比べると３℃は高く，年間降雨量も2,２１３㎜に達する。これはヌクアロファの1,７３３㎜にくらべ４８０㎜も多い。極値としてヌクアロファで夏季に３１.９℃，冬期に１０.６℃，降雨量は年間2,４４０㎜に達したことがある。（表－１）

一般的に云ってトンガの気候は亜熱帯性で，南東季節風が涼風を送りつゞける海洋型で一年を通じて過ごし易い気候と云える。

夏期の１２月～４月には熱帯性のサイクロンが赤道附近で発生し，西北方向より東南方向へと急速に移動する。

2）地　　震

トンガ列島（Tonga Islands）の東側海底には大規模なトンガ海溝があり，又西側には火山列島がほぼこれらに平行して点在している。

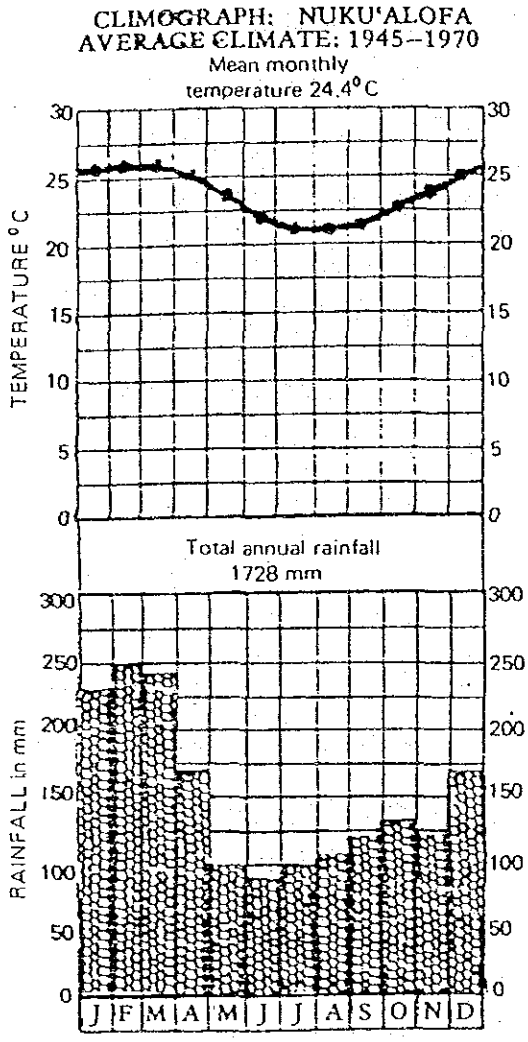
すなわちトンガ列島は地震の原因として有力なプレートテクトニクス理論のあてはまる典型的な地勢にあり，日本と同様の地震国と考えられる。たゞ日本と異なる点としては，広い海域のごく一部に点在する島を直撃して，その建物に被害を与える事例が少ないので，問題とされる事が少なかったことが挙げられる。しかしこれは確率上の問題であるから直撃を受ければ大きな被害をもたらす。１９７７年６月の地震ではトンガタブ島にかなりの被害が出ている。

又それ以前に於ても図－２に示す様に地震は高頻度で発生して来た。

3) サイクロン

熱帯性サイクロンが北方洋上に発生し南下する。日本の台風より半径は小さいが，風速は同等を考えられる。過去に大きなものとしては１９１２年と１９３７年に襲来したが 1980 年３月にも風速４５knot／hr（２３m／sec）～60 knot／hr（３１m／sec）程度のものは２回起っており，１９８２年３月３日には"Isaac"が襲来し甚大な被害を受けている。このサイクロンはニウアの北方約１８０マイルの地点で発生し，北東より南西にかけてトンガ列島を縦断した。風速は６５knot／hr（３４m／sec）～８５knot／hr（４１m／sec）で時には１２０knot／hr（６２m／sec）の突風を伴い，各所に於て建物，農作物に被害をもたらした。

表－１



トンガタブ島に於てはサイクロンが島の西側洋上を通過した為，西半分が建物，農作物を含めより大きな被害を蒙っている。

建物に関しては特に木造家屋の全壊も散見され，屋根部分を破壊された建物は随所に見られた。又今回のサイクロンはトンガタブ島に於ては満潮時とはかさならなかったが，ソプ（Sopu）の海岸附付では高波による被害を受け，地上高 1.2 m 位

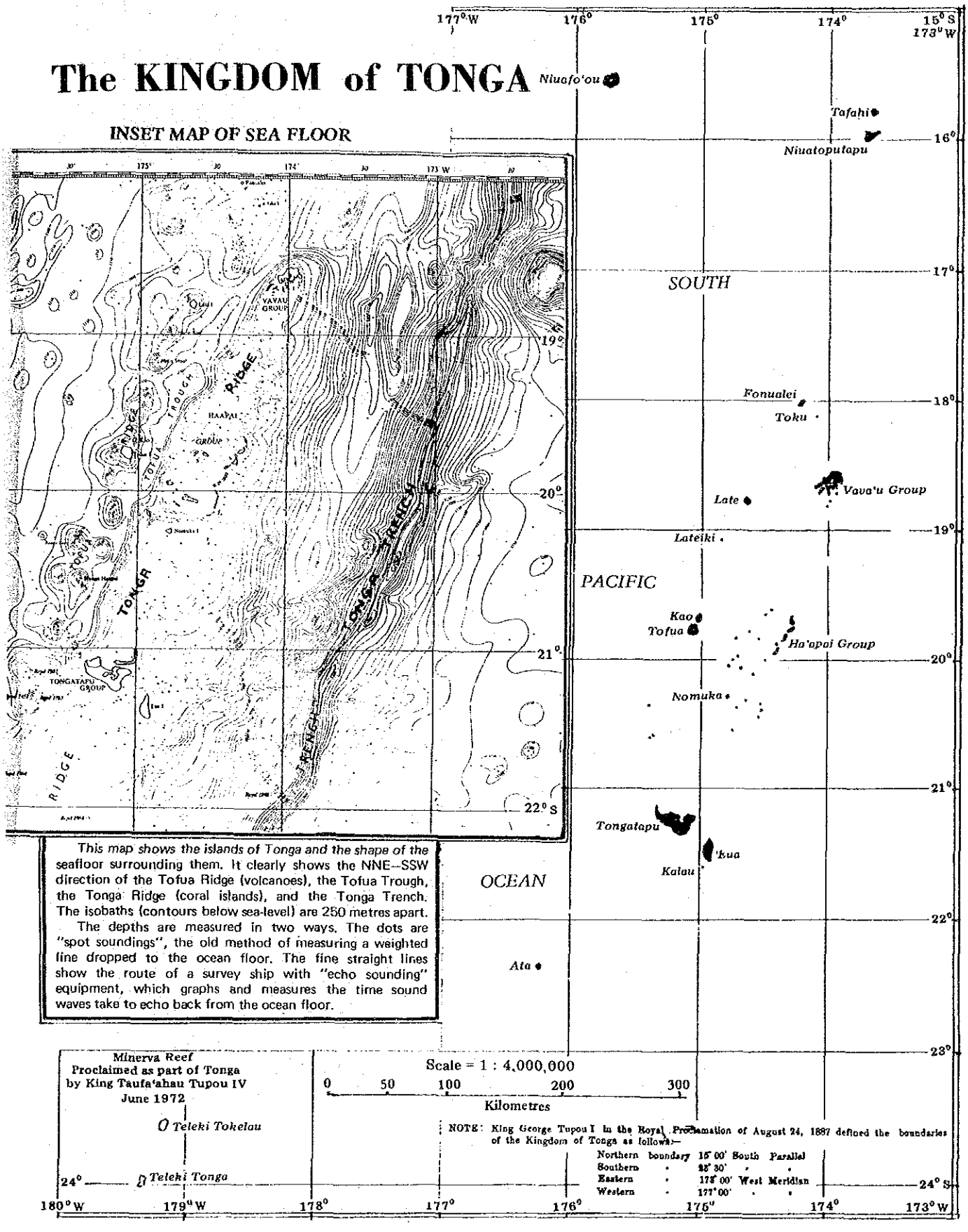
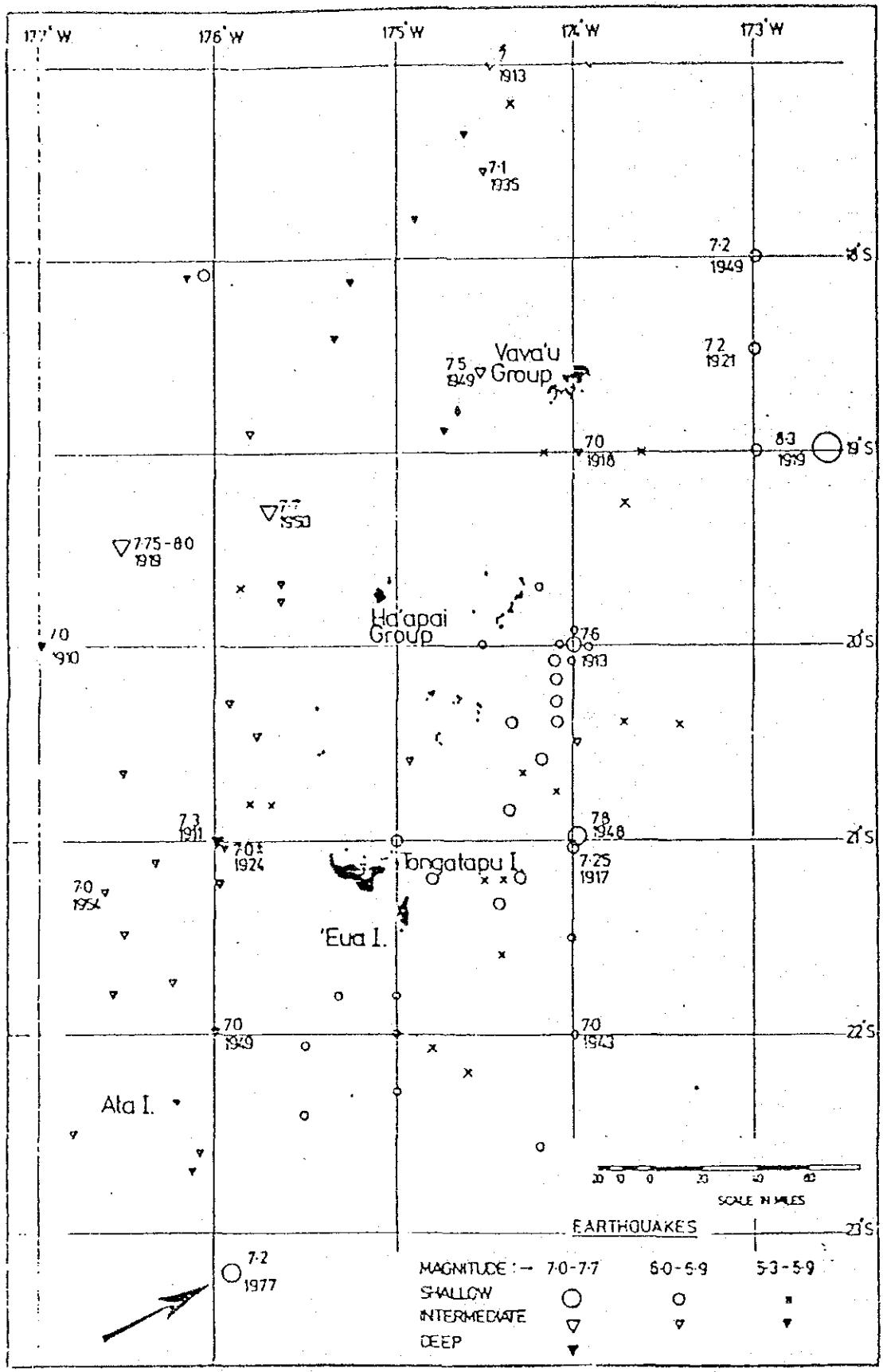

The KINGDOM of TONGA
INSET MAP OF SEA FLOOR
Niuafo'ou
Tafahi
Niuatoputapu
Fonualei
Toku
Vava'u Group
Late
Lateiki
Kao
Tofua
Ha'apai Group
Nomuka
Tongatapu
'Eua
Kalau
Ata
SOUTH
PACIFIC
OCEAN
TONGA RIDGE
TONGA TRENCH
TOFUA TROUGH
TONGATAPU GROUP
VAVAU GROUP
This map shows the islands of Tonga and the shape of the seafloor surrounding them. It clearly shows the NNE–SSW direction of the Tofua Ridge (volcanoes), the Tofua Trough, the Tonga Ridge (coral islands), and the Tonga Trench. The isobaths (contours below sea-level) are 250 metres apart.
The depths are measured in two ways. The dots are "spot soundings", the old method of measuring a weighted line dropped to the ocean floor. The fine straight lines show the route of a survey ship with "echo sounding" equipment, which graphs and measures the time sound waves take to echo back from the ocean floor.
Minerva Reef
Proclaimed as part of Tonga
by King Taufa'ahau Tupou IV
June 1972
Teleki Tokelau
Teleki Tonga
Scale = 1 : 4,000,000
0 50 100 200 300
Kilometres
NOTE: King George Tupou I in the Royal Proclamation of August 24, 1887 defined the boundaries of the Kingdom of Tonga as follows:—
Northern boundary 15° 00' South Parallel
Southern " 23° 30' " "
Eastern " 178° 00' West Meridian
Western " 177° 00' " "
177°W 176° 175° 174° 173°W
15° S
16°
17°
18°
19°
20°
21°
22°
23°
24° S
180°W 179°W 178° 177° 176° 175° 174° 173°W

図 — 1



LOCATION OF TONGA EARTHQUAKE JUNE, 1977 AND RECORDED EVENTS BEFORE 1988

図 — 2

TROPIAL CYCLONE TIA
24 - 25 MARCH, 1980

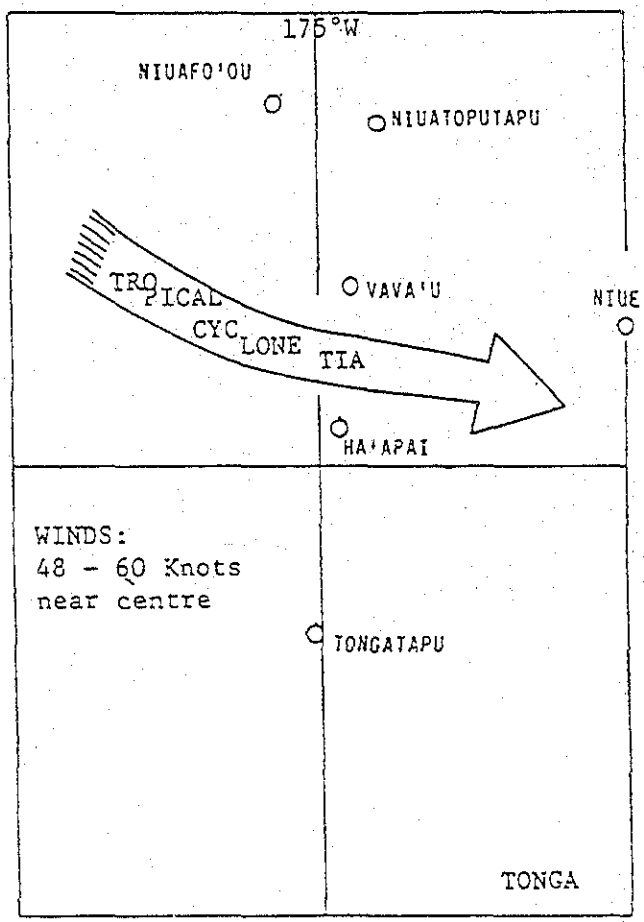


図 — 3

TROPICAL CYCLONE VAL
27 - 28 MARCH '80

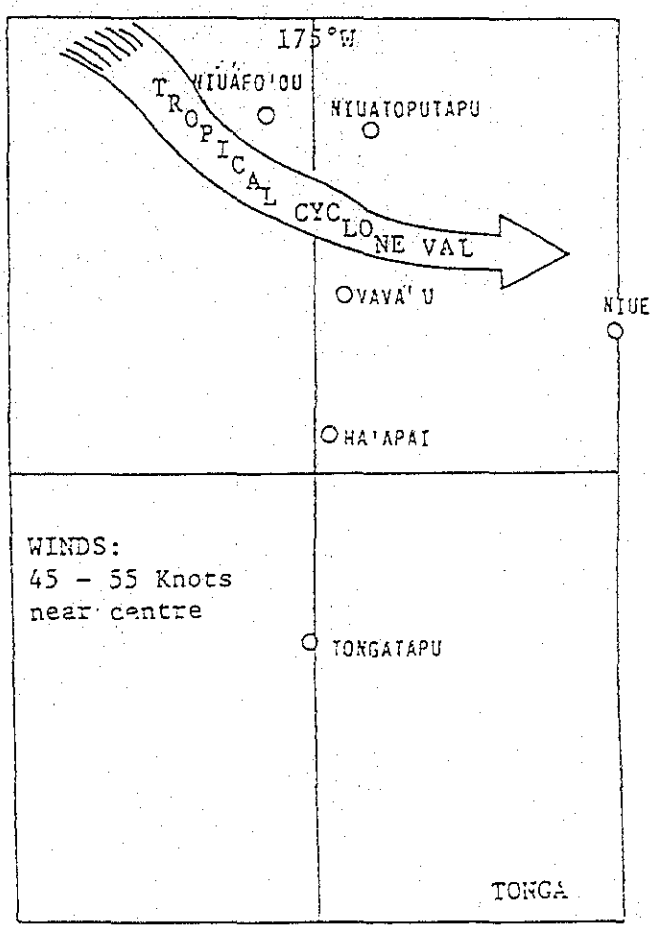


図 — 4

Way of the Killer Cyclone

This is the inside story of Cyclone Isaac — provided by Met Officer Laitia Fifita of the T&T Department.

Tropical Cyclone Isaac originated about 180 miles north of Niue at 1.00 a.m. on March 2. As he moved SW at about five knots, sustained winds of over 35 knots close to his centre were intensifying. A cyclone alert for the whole of Tonga was issued at 4a.m.

By 10a.m Isaac was centred about 340 miles northeast of Vava'u, with near-centre winds now up to 60 knots and still intensifying as southwest movement continued. A gale warning for Vava'u was issued at 4p.m. Ha'apai and Tongatapu were kept on cyclone alert. Isaac was by then up to 65 knots, gusting to 90 knots.

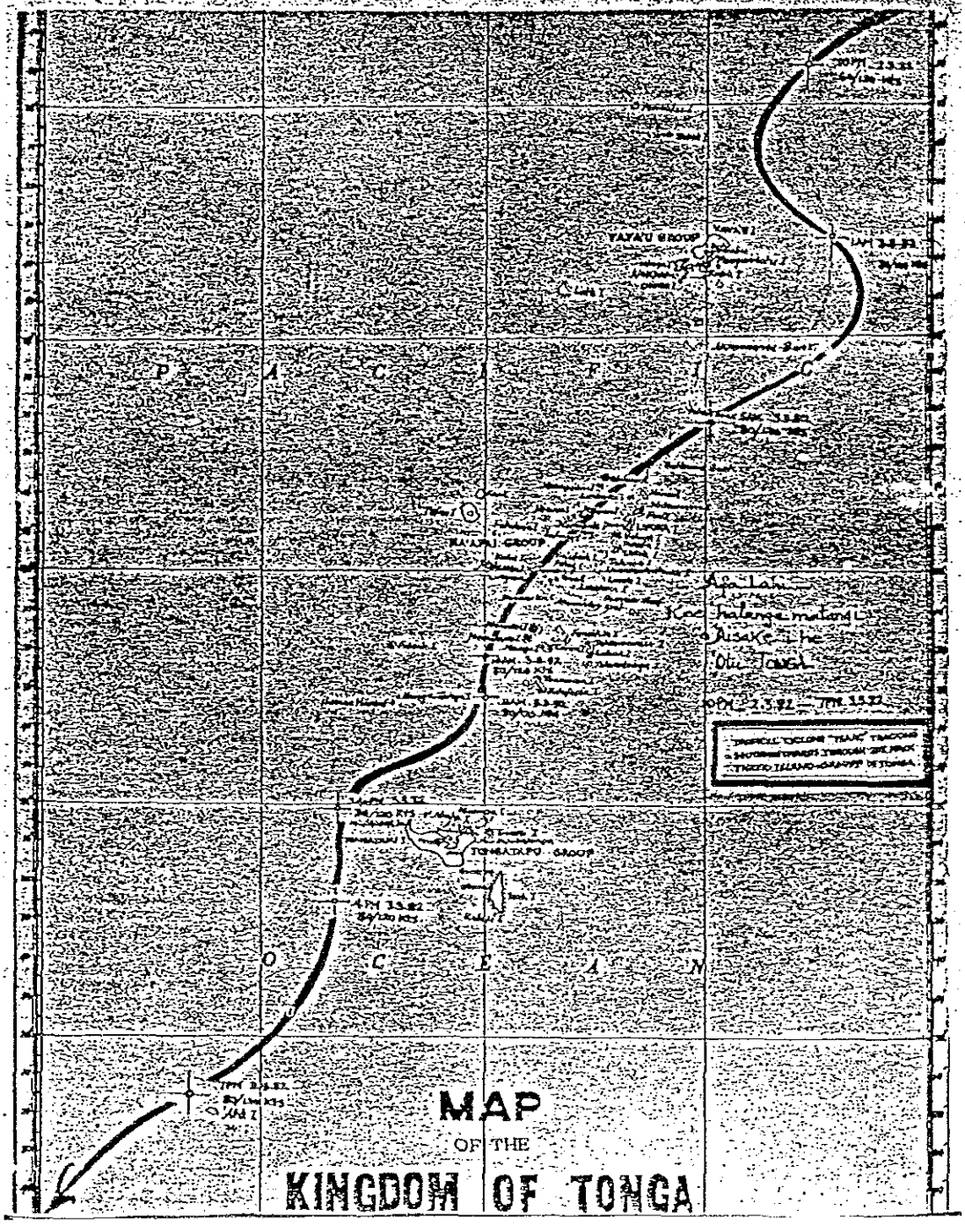
Six hours later, hurricane warnings were in force for Vava'u and Ha'apai and a tropical cyclone alert for Tongatapu. At this stage, the cyclone was about 50 miles east-north-east of Vava'u, average wind force 80 knots and gusts to 120 knots, with hurricane-force winds within 25 miles of the centre.

At 1a.m. on Wednesday, March 3, the centre was about 40 miles east of Vava'u and by 5a.m. it has moved down to 20 miles northeast of Lifuka Island in the Ha'apai Group.

By 11a.m. Isaac had moved still further south, probably through the Kotu Group and near to Nomuka. It was centred about 20 miles NNE of Nuku'alofa and about 20 miles west of Ha'atafu at 1.40 p.m and about 30 miles off at 4.00 p.m. It then gradually moved away in a SSW-direction.

Indications are that the cyclone "eye" (the comparatively still centre, usually six to 15 miles across) was experienced in

(Turn to page 24)



図－5

まで浸水を蒙っている。前記の様にローム層の水はけが悪く且つ島全体が平坦であるため，湿地帯の様相を呈している場所も見うけられた。（図－３，４，５）

１－４　建築資材，労務事情

建築資材はトンガタブ島にある工場で生産されるコンクリートブロック，海砂，骨材としてのコーラル石灰岩の砕石，足場・サポート用としての椰子丸太位が現地産で，その他の建築資材はすべて輸入に頼っている。需品局（Commodities Board）がニュージランド，オーストラリヤ，フィジー，日本，フィリッピン等より建築材料を輸入し，これを一般に販売している。

現地の労務事情，技能レベル，調達可能資材及び建設機械等の事情は日本と比較した場合は大きなへだたりがある。しかし本計画程度の規模で且つ現地になじみの多い工法を採用する限り問題はない。

但し調査時点に於ては前記サイクロン襲来後１ケ月である為，被害建物（主として住宅）の復旧作業が軌道に乗っておらず今後の復旧作業の進み方によっては，労務事情の払底を招くことが予想される。

労務費について今回の調査データを２年前調査したものと比較すると２０％～３４％程度の値上り率であるがこの様な状況のため今後更に労務費の値上りも当然予想される。

建築資材についてもセメント３７％，鉄筋１２㎜φ４８％上昇，木材，配管材料は横ばい状態であるが災害復旧の進捗状況によっては値上りの要素を多分に含んでいる。

１－５　建設工事の実情

トンガタブ島には民間の建設会社が３社あるが，建設省（Ministry of Works）と需品局（Commodities Board）も公社の建設のみならず，民間の建設も請負う。民間で最も大きい施工会社は資本金２００,０００T$（¥５２,６００,０００　３月１９８２年レートで換算）技術者数約２５人である。

労務者については賃金も安いが能率も落ち，且つ職種の分化もあまり進んでいないためいわゆる熟練工が少ない。しかし各国の援助による規模の大きい建物も増えつゝあり，外国人技師も多数指導に当っていることから，徐々にその技術も向上しつゝある。

ヌクアロファにある施工会社としては，NAKAO　CONSTRUCTION，

E.M.JONES, TONGA CONSTRUCTION がある。

1－6 建 設 工 期

現地の１２～４月は雨期であり，又年間を通じて日本より雨量は多い。又労務者の能率も日本の 1／3 程度であり施工期間については日本の場合の倍以上見込む必要がある。本工事を早急に実施するとすれば，前述の様なサイクロンに依る被災後であり，その復旧工事の状況如何が工期等に影響すると考えられる。

2. 設計の基本方針

2－1　設　計　方　針

前記建築基盤概要の条件及び現地事情を考慮して，建築設計上の指針となるべき基本方針を下記にまとめる。

1) 地震，サイクロン等の災害に対して強固かつ耐用年数の永い建物とすること。

2) 現地資材を多用し，現地の施工能力に応じた現地工法を採用することにより将来のメンテナンスを容易ならしめる。

3) 建物完成後の運営コストに対する現地事情を考慮する。

4) 亜熱帯性気候・風土に適した建物とする。

2－2　建　物　概　要

新検査棟及び渡り廊下

構造規模 ： 基礎：鉄筋コンクリート布基礎

壁　：補強コンクリートブロック造り

屋根：木造トラス小屋組

上記構造平家建１棟及び渡り廊下

延床面積５９５.７５m^2（渡り廊下を含む）

2－3　配　置　計　画

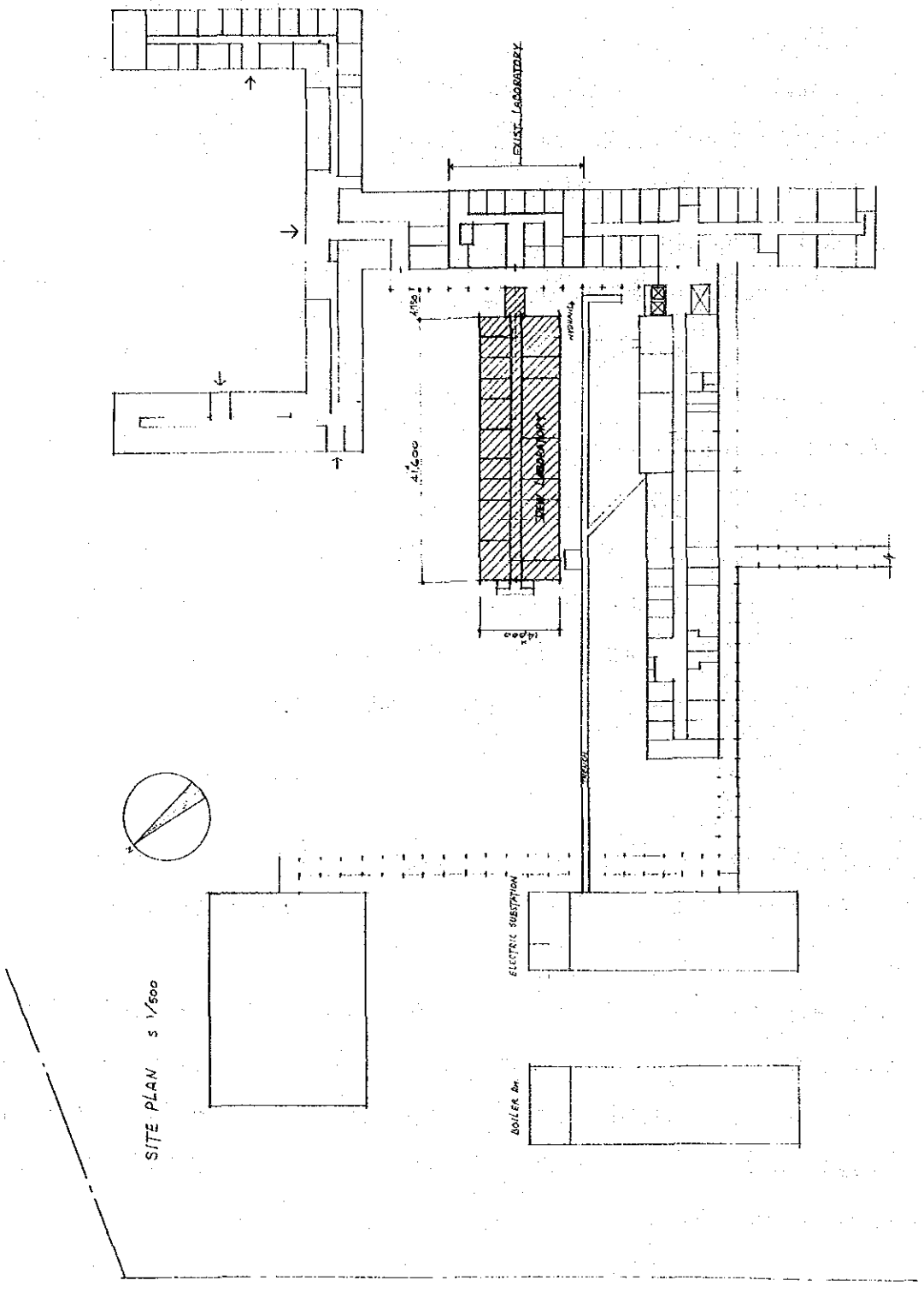
新検査棟は既存のＶＡＩＯＬＡ病院内の在来検査棟に隣接した中庭部分に計画され，通風，採光の面から在来棟（３階建）に直角に配置する。建物長軸方向は北東－南西となる。

現地調査の結果，在来棟との間隔を4.７５０mとし，双方の出入口を渡り廊下にて直接接続することゝした。これによって平行する隣棟との間隔は北側約１９m，南側は約１３mとなり，予定建物は平家建であるため採光，通風に関する相互の影響は少ない。

敷地南側に既存のトレンチが建家と平行に設けられており，予定建物に近い位置に蒸気と給湯の分岐が既に設けられている。

又屋外消火栓が予定地内に一ケ所設置されているが，これはトンガ側で南側に移設することが可能である。

配置図



2－4　平　面　計　画

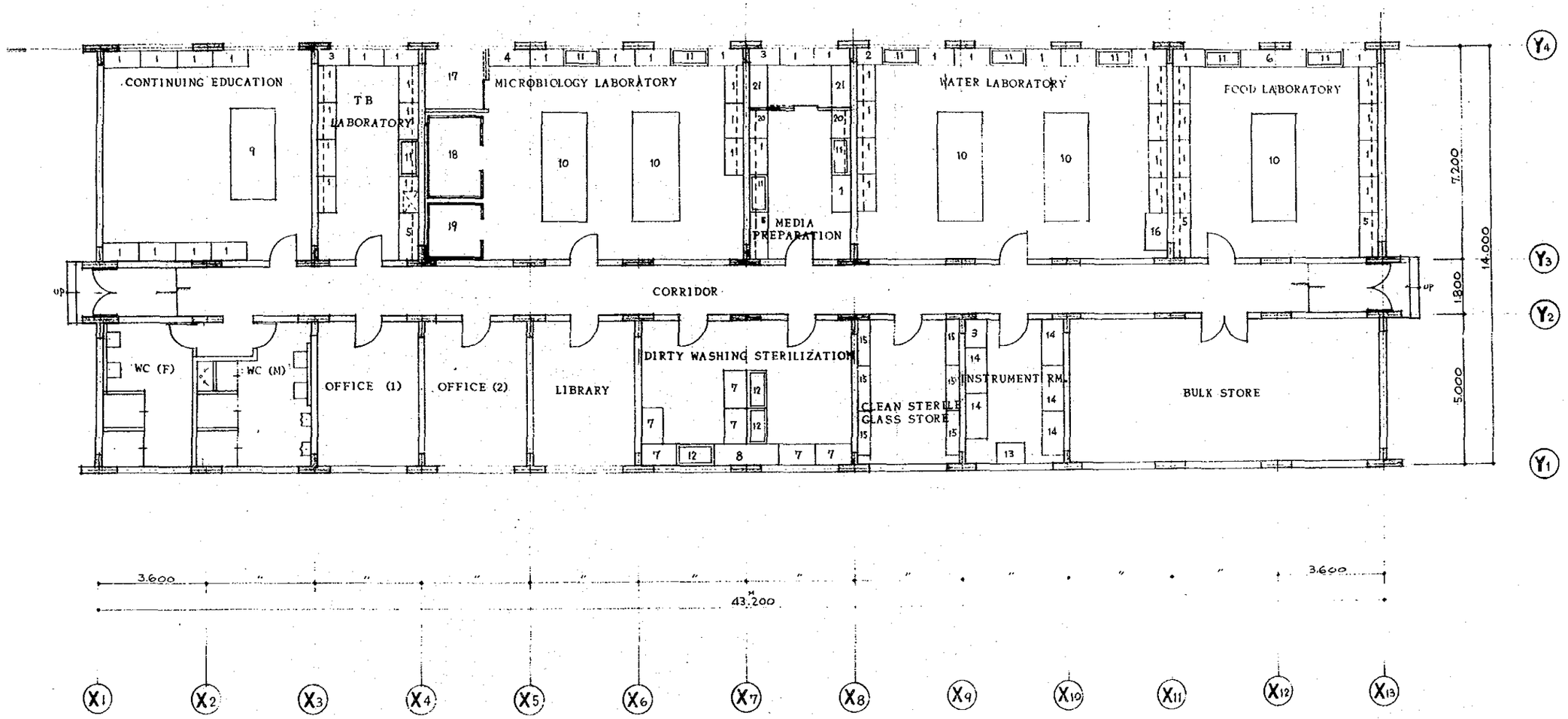
トンガ側草案にもとづく平面図－1に基づき，Water LaboratoryとFood Laboratory の使用効率等を中心に検討した結果，各室レイアウトについては平面図－2に示す平面でトンガ，WHO側との合意に達したが，その過程に於てトンガ側草案の桁行方向のスパン3.6 m を3.2 m に縮少し，12スパンを1スパン追加して13スパンとして事務室及び会議室を各1室設けることゝした。但しこれについては建設費と予算との関係で止むを得ない場合は削除する条件を付している。又電源引込及びスタビライザーの設置場所については，建物西妻側に2.0 m × 1.2 m の配電盤室を設けた。各室使用のガスについては，既存の検査室では各室にＬＰＧボンベを置いて使用中であるが，建物新設に伴い使用量が増加するので，管理上の面からも集中方式とすることが必要なため，西妻側に2.0 m × 1.2 m のＬＰＧボンベ室を設けた。

各室実験台等のラボトリーファニチュァーについても各室毎に打合せの結果，平面図図－2に示す形で合意をみた。

2－5　断面及び立面計画

断面についてはトンガ側より越屋根型のクリヤストーリー方式が提案されていた。これについては検討の結果，風害，漏水及び工費等の面から，より単純な切妻方式を提案，了承された。又中廊下方式となる為，採光，通風については廊下両側の室との間仕切に採光，通風を兼ねた窓を出来るだけもうけて維持費の軽減と居住性の向上及び管理面での効率を考慮した。

立面については在来建物との調和の問題もあり屋根の形を寄棟方式とし，巾広の軒先の水平ラインを強調した形の要望があった。周囲の景観との調和を考慮し，病院全体のイメージの統一の面からも妥当と思われる。



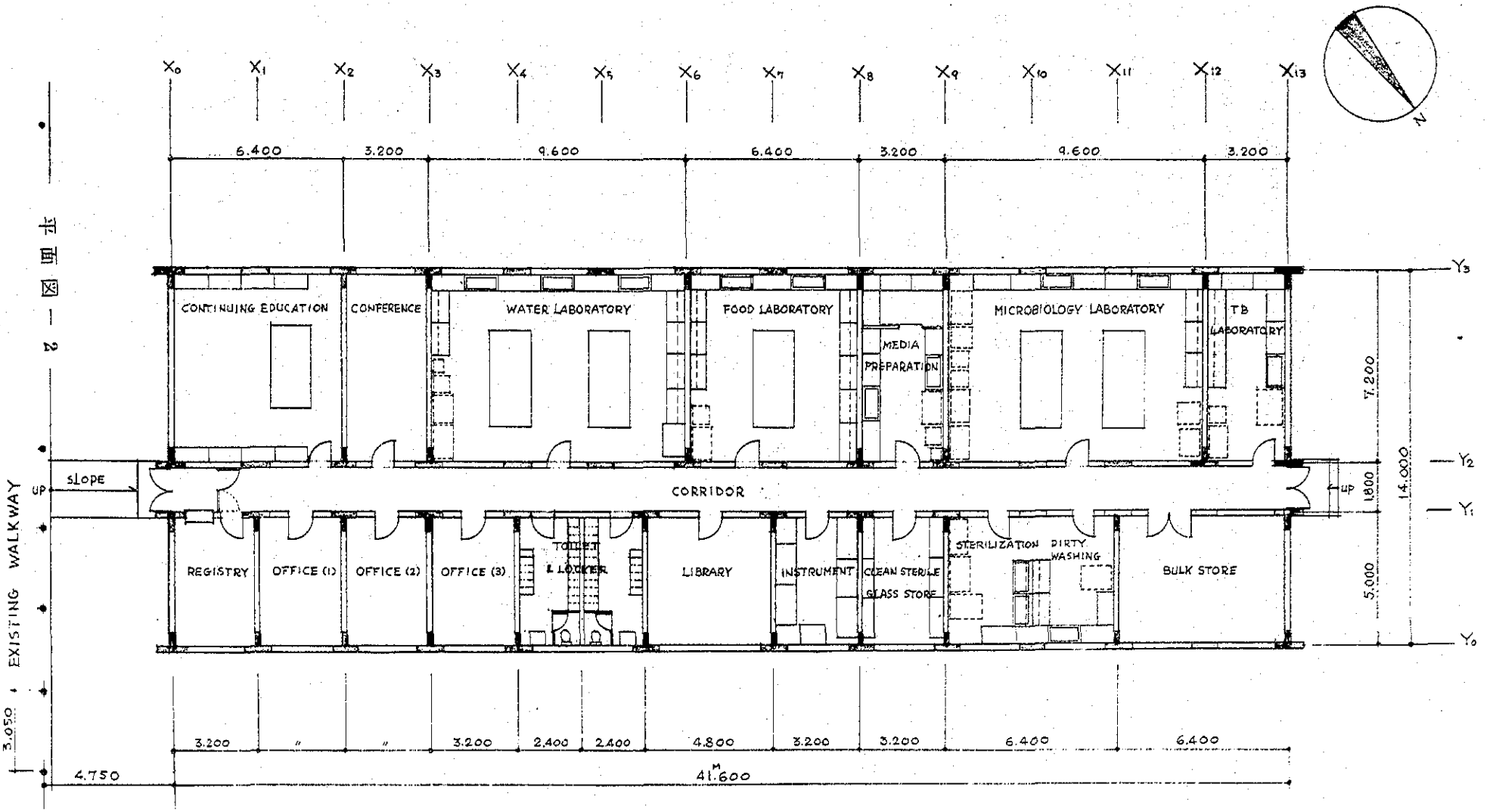
THE NEW LABORATORY PLAN

平面図－1

S: 1/100

29. MARCH '82

平面図 — 2



NEW LABORATORY PLAN

5, APRIL 1982

2－6　工法の選択と構造計画

建物構造，工法の選択については，工事発注形態を現地施工業者に直接発注することも可能であることを前提としたので，現地に於て多く採用されている方式を基本とした。現地調査の結果では，木造（ニュージランド輸入木材による構造）及びコンクリートブロック（現地製造のコンクリートブロックによる）が主で，鉄筋コンクリート造の建物もあるが僅少である。

又前記の様にトンガ地域は地震の多発地帯であるため，建物の構造，工法としては，病院施設としての性格上からも災害時に於ける避難をすみやかに行なえることが必要である点，また敷地の状況からも実施可能であり，周囲との調和という点でも望ましいことを勘案し平家建とした。

構造としては壁を鉄筋コンクリートで補強したコンクリートブロック造，上部を木造トラスによる小屋組とし，その上に亜鉛鍍鉄板瓦棒葺の屋根として建物の上部構造を軽量化することにより，耐震的に有効な構造，工法としている。

木材は主としてニュージランドの輸入材が使用されているが，ボアー（Borer）と称する虫害がある。ニュージランド，トンガ，西サモア地域でその被害が見られるが，対策として製材したものを薬液処理しているが建物の下部に木材を使用することは湿気も多く好ましくない。

敷地地盤については予定地にテストピットを掘った結果，表土は約８０㎝，その下に約１２０㎝のローム層が下部のコーラル混じりの地層にはさまれており，このローム層を支持地盤とし，地耐力として５ ton/m^2 を採用，鉄筋コンクリート布基礎とした。

地震力については現地にて採用されているニュージランド規準より厳しい日本の規準に準拠し，震度Ｋ＝０.２を採用。

風圧力は１９８２年３月のサイクロン被害の教訓から，特に壁構造体と屋根小屋組の取合部を取付金物類の有効使用により堅固にすることをはかっている。

仕上材についても原則として現地にて容易に入手出来るものを主とし，建物完成後の維持管理を安価に且つ簡便に出来ることを意図している。

2－7　設　備　計　画

付帯設備に関しては熱源－蒸気，給湯については予定建物の西側にエネルギー棟がありこゝより南側の建物に沿って地中トレンチにて各棟へ分配している。

現在増築予定にそなえて既に配管の分岐が予定建物に近い位置に設けられてあり，これより分岐配管が可能である。

給水，排水についても，予定地の北及び東側に各々既存の3″φ給水管，排水桝があり，排水は病院敷地の南西隅に病院全体の排水浄化設備が設けられている。

電源については敷地南西側の建物に変電室があり，こゝより約５０ｍの地中埋設で３相４線で電圧$^{415}/_{240}$Ｖ，５０Ｈｚにて予定建物に供給可能である。

建物内部の付帯設備については使用予定の検査機器の検討に沿った修正を行い，建築的な面よりその調整を行なった。

2－8　建設工事費　　1982年4月（ T$ 1 ＝ ¥ 263 ）

建物規模及び構造

補強コンクリートブロック造壁，木造トラス小屋組平家建1棟及渡り廊下

延床面積　595.75 m^2

建設工事費

1.	建築工事費	一式	35,100,000 円
2.	電気設備工事費	一式	5,673,000
3.	機械設備工事費	一式	3,869,000
	直接工事費計		44,642,000
4.	共通仮設費	一式	2,238,000
5.	諸経費	一式	6,720,000
	計		53,600,000
6.	コンテンジエンシイ	10%	4,400,000
	合計		58,000,000 円

2－9　維持管理費　　1982年4月　（T$1.00＝¥263.00）

		年　額
1.	給　水	104,400 円
2.	給　湯	167,900 円
3.	ガ　ス（L.P.G.）	636,240 円
4.	蒸　気	623,500 円
5.	電　気	1,778,500 円
	合　計	3,310,540 円

1. 給水量の算定

水栓　26ケ

Q_H ＝26ケ×7ℓ/ケ×15回/Hr×42％

＝1,150ℓ/Hr

＝9,200ℓ/日　（1日＝8 Hr）

TONGAの使用料金（1ケ月当たり）

0　～　1,000 gal　0.94T$ ×263円＝253円/1000 gal

1,000～5,000 gal　0.84T$ ×263円＝220円/1000 gal

5,000 gal ～　0.72T$ ×263円＝190円/1000 gal

月間給水量　1ケ月＝22円として

Q_H ＝9,200ℓ/日×22日/月＝202,400ℓ/月

＝ 44,980 gal/月

253円＋（4×220円）＋（44.98－5.）×190円＝8.712.1円/月

≒8,700円/月

年間給水使用料金

8,700円/月×12ケ月＝　104,400円/年

2. 給湯量の算定

水栓　20ケ

Q_H ＝20ケ×5ℓ/ケ×5回/Hr×25％

＝125ℓ/Hr

＝1,000ℓ/日　（1日8 Hr）

従って１日当たりの使用熱量は

1,０００ℓ/日×（６０℃－２５℃）＝３５,０００Kcal/日となる。

給湯ボイラーの効率を０.８，燃料発熱量を１０,５００Kcal/kg，比重を０.９とすると，１日当たりの燃料消費量は下記の様になる。

３５,０００Kcal/月÷０.８÷１０,５００Kcal/kg÷０.９＝４.６３ℓ/月

年間燃料消費量　１年間を２５０日/年として

４.６３ℓ/日×２５０日/年＝１,１５７.５ℓ/年

TONGAの燃料単価　　1 gal＝2.46T$×２６３円＝６５０円/gal

1 gal＝４.５ℓとして　１４５円/ℓ

従って，年間コストは1,１５７.５ℓ/年×１４５円/ℓ≒ **１６７,９００円/年**

3. ガス量の算定

ガスコック　３３ケ

Q_H ＝３３ケ×０.１kg/ケHr×４０％

＝１.３２kg/Hr

＝１０.５６kg/日　（１日８Hr）

年間ガス使用量　年間２５０日/年として

Q_Y ＝１０.５６kg/日×２５０日/年

＝２.６４０kg/年

TONGAのL.P.G.単価

３０kgボンベ１本　27.4T$ ×２６３円＝７,２０７円/３０kg

従って１kg当たり　２４１円/kg

年間ガス使用料金

２,６４０kg/年×２４１円/kg＝ **６３６,２４０円/年**

4. 蒸気量の算定

オートクレーブ	５１kg/Hr×２台×２Hr/日	＝２０４kg/日
煮沸消毒機	２５.５kg/Hr×１Hr/日	＝２５.５kg/日
	計	２２９.５kg/日

蒸気ボイラーの効率を0.７５，燃料発熱量を１０,５００Kcal／kg，蒸発潜熱を５３０Kcal／kg，比重を0.9とすると，燃料消費量は下記のようになる。

２２９.５kg／日×５３０Kcal／kg÷0.７５÷１０,５００Kcal／kg÷0.9

＝１７.２ℓ／日

＝4,３００ℓ／年　（年間２５０日として）

給湯の項よりTONGA単価は　１４５円／ℓ

従って年間コストは

4,３００ℓ／年×１４.5円／ℓ＝ **６２３,５００円／年**

5. 電気量の算定

照　　明	3,４００VA／Hr×８０％＝	2.７２KVA／Hr
コンセント	３９,２７０VA／Hr×４０％＝	１５.７１KVA／Hr
空　　調	7,５５０VA／Hr×８０％＝	6.０４KVA／Hr
		２４.４７KVA／Hr

１日８Hr　１ケ月を２２日とすると

月間電力量は　２４.４７KVA／Hr×８Hr／日×２２日／月＝4,３１０KVA／月　となる。

TONGA電力料金

基本料金　　6T$／KVA・月×　２６３円／T$　＝１５７８円／KVA・月

使用料金　0.０６T$／KVA・Hr×２６３円／T$　＝１５.７８円／KVA・Hr

≒　１６円／KVA・Hr

基本料金

５０.２２KVA×1,５７８円／KVA・月　＝　７９,２４７円／月

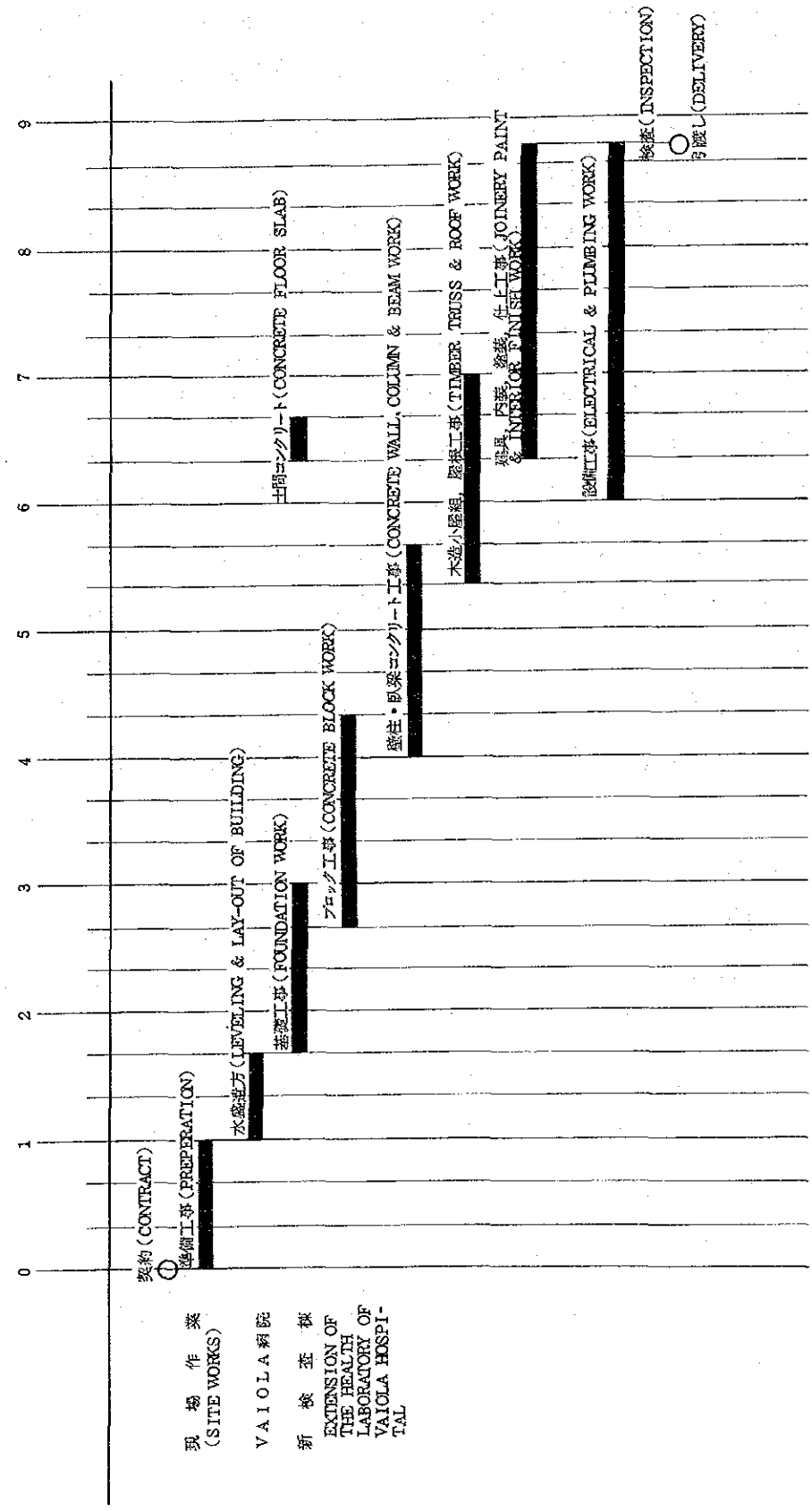
使用料金

4,３１０KVA×１６円／KVA　＝　６８,９６０円／月

１４８,２０７円／月

年間電力料金は　１４８,２０７円／月×１２ケ月＝ **1,７７８,５００円／年**

2－10　工　程　計　画　（WORK SCHEDULE）



B. 実 施 設 計 図 書

SPECIFICATION

FOR

EXTENSION OF THE HEALTH LABORATORY

OF

VAIOLA HOSPITAL

1982

JAPAN INTERNATIONAL COOPERATION AGENCY

ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.

C O N T E N T S

1. GENERAL CONDITIONS

1 - 1 Title of the Project
Extension of the Health Laboratory of Vaiola Hospital

1 - 2 Address of the Site
Vaiola Hospital Nuku'alofa, Tongatapu, the Kingdom of Tonga.

1 - 3 Outline of Building
Reinforced concrete block wall, timber truss roof, one storied building with connecting corridor.
Total floor area including open corridor 595.75m^2

1 - 4 Scope of Works

1 - 4 - 1 Building and incidental facilities shown on drawings.

1 - 4 - 2 Items not included in the work
Laboratory furniture, Air-conditioner, Ceiling fan, Gas cylinder(L.P.G.) Ventilator.

1 - 5 Contract Documents
Contract Documents shall involve the items listed below and the sequence of these items shall indicate the priority in case of discrepancy between the Documents. The smaller number item shall govern the larger one.

(1) Interpretation (questions and answers) and Addenda (supplimentary instructions to Tenders) issued prior to Tender.
(2) Drawings
(3) Specifications

Information or instructions necessary to Work, but not indicated on Drawings nor described in this specifications, shall be refered to NZS and such Work shall conform to the relevant provision of NZS.

1 - 6 "Approved Equal"
A manufactured and/or fabricated product, a factory or a method of work, even if it does not conform to specific requirement described in this Specifications, is able to be adopted upon the Supervisor's approval as equivalent.
In this case the Contractor shall submit Copies of necessary information proving the equivalence of the matter to the Supervisor for approval.
Also the Contractor shall, if required, furnish an affidavit certifying it.

1 - 7 Approval of the Agent
The Contractor shall submit to the Supervisor three copies of the curriculum vitae of the Agent for approval at the start of the Work.

1 - 8 Approval of the Subcontractor

The contractor shall submit to the Supervisor three copies of the name list of the Subcontractors for approval. When requested by the Supervisor the Contractor shall submit data which inform of the ability of the Subcontractor.

1 - 9 Pictures of the Site

The Contractor shall take pictures of the site which show the state of things of the site before the start of Site Work and shall keep them appropriately.

1 - 10 Programme of the Work

The contractor shall submit to the Supervisor three copies of Programme of the Work for approval.

1 - 11 Monthly Report

The contractor shall submit to the Supervisor two copies of Monthly Report on Construction Work, which describes the amount of executed work and other facts in accordance with the Supervisor's instruction.

1 - 12 As-built Drawing, etc.

The Contractor shall submit to the Supervisor such documents as follows at the time of completion in accordance with the Supervisor's instruction.

(1) As-built Drawings
(2) Photographic record of completed buildings, incidental facilities and so on.
(3) Documentary evidence of the permission or the approval obtained from governmental or public offices regarding the provisions of statute, ordinance, regulation or law.
(4) Documents which are necessary for the maintenance of buildings, incidental facilities, and equipments such as catalogues, descriptions, records and guaranties.

2. TEMPORARY WORK

2 - 1 Scheme of Temporary Work
The Contractor shall submit to the Supervisor the Scheme of Temporary Work for approval prior to Site Work.

2 - 2 Office for Supervisor at Site
Not necessary

2 - 3 Water Supply for the Work
Available, but the installation cost and the charge shall be borne by the Contractor.

2 - 4 Power Supply for the Work
Available, but installation cost and the charge shall be borne by the Contractor.

3. EXCAVATION, FILLING, GRADING AND COMPACTION

3 - 1 All excavations and filling shall be carried out by the contractor.

3 - 2 Excavate and fill to finished levels shown. Cut batters to true and even face line.

3 - 3 Fill where necessary to levels shown with subsurface materials in layers not exceeding 150mm in thickness consolidate well.

3 - 4 Remove all surplus subsurface material and vegetable matter. Load out and cart away.

3 - 5 Take all necessary precautions to protect existing trees and their roots.

3 - 6 All excavations shall be clean, free from loose material before placing any concrete.

3 - 7 Should soft ground, bad ground, or filling be encountered, the excavation shall be taken to an approved depth to satisfaction of the Supervisor.

3 - 8 Should excavations be taken too deep, then such portions shall be filled in with concrete at the contractor's expense, and to the Supervisor's satisfaction.

3 - 9 Area beneath building shall be brought to the levels necessary to support concrete floor slab by hardfilling consisting of broken stone, screenings or tailings, river sand or pit shingle or similar non-plastic material approved by supervisor and shall be well compacted.

3 - 10 Under all concrete slabs laid on fill provide and lay waterproof membrane of FOURTECON 2000' or equal with joints lapped 300mm and jointed with pressure sensitive tape 'Norton 500' or equal.

3 - 11 The contractor shall remove from the site all material whether excavated or imported, which has not been approved by the supervisor for use as backfill, hardfill and the like and is not required for other specified work.

3 - 12 Area beneath the foundation shall be filled by broken stone or similar material approved by Supervisor to the depth as shown on the drawings and shall be well compacted.

3 - 13 Where fill is required to raise the subgrade for concrete floor slab to the elevations indicate on drawings, topsoil shall be well compacted in order to prevent differential settlement of concrete floor slab.

4. CONCRETE WORK

4 - 1 All work shall be carried out in a workmanlike manner to sound trade practice by experienced tradesmen.

4 - 2 All concrete shall be mixed and placed in accordance with NZSS 1900 Chapter 9.3.

4 - 3 No concrete shall be placed in unfavourable weather conditions.

4 - 4 Details of the concrete mix shall be submitted to the Supervisor prior to the first mix being made.

4 - 5 When directed by the Supervisor, concrete test blocks shall be taken. The Contractor shall allow for the hire of test moulds, the making of test blocks, and their transport to the testing laboratory.

Test results relating the blocks to their position in the structure shall be submitted to the Supervisor.

4 - 6 All concrete shall have a minimum crushing strength of 180kg/cm^2 at twenty eight (28) days unless otherwise specified.

4 - 7 Cement shall be Portland Cement complying with the requirements of NZS 43 and properly stored and handled at all times so as to be protected from moisture.

4 - 8 Fine aggregate shall be clean, coarse silicious sand free from silt, salt, organic or other deliterious material to satisfaction of the Supervisor.

4 - 9 Coarse aggregate shall be clean, hard, strong durable crushed basalt to satisfaction of the Supervisor.

4 - 10 Water shall be clean water, and free from organic matter or suspended materials.

4 - 11 Concrete shall be mixed in an approved power driven mixer. The mixer shall not be overloaded. Every batch of concrete shall be mixed for at least 1½ minutes, and shall be completely exptied from the mixer before the next batch is mixed.

4 - 12 All footings shall be dry and free from mud or loose material. The concrete shall be thoroughly worked and consolidated around the reinforcement.

4 - 13 All concrete shall be kept continuously damp for at least seven (7) days after placing.

5. F O R M W O R K

5 - 1 All formwork shall be free to line and surface in accordance with the accurate dimensional placing of the concrete as shown on the drawings.

5 - 2 All formwork shall have tight, close joints and shall be made of timber of non-staining quality.

5 - 3 All formwork shall be rigidly braced so as to remain true to line and dimension, and no dismantling shall take place until adequate time has been allowed for setting of concrete in accordance with N.Z.S.S. 95 para 511.

5 - 4 Formwork shall be removed without shock or vibration to concrete.

6. REINFORCING STEEL WORK

6 - 1 All reinforcing steel shall be deformed bars which shall have minimum yield strength of 3.0 t/cm^2 .

6 - 2 All steel shall be of the sizes shown on the drawings.

6 - 3 All steel shall be free from grease, paint, rust, scale and dust.

6 - 4 All steel shall be straight and free from kinks.

6 - 5 All bends, hooks, shall be bent cold.

6 - 6 All deformed reinforcing rods shall be lapped 40 diameters.

6 - 7 All steel shall be placed and securely fixed in accordance with the drawings.

Bind all intersections and all splices with black annealed 16 gauge wire.

Bind and support all steel such that no displacement can occur during pouring, tamping or vibrating of concrete.

6 - 8 Allow minimum 40mm cover to all steel unless specified otherwise.

7. CONCRETE BLOCK WORK

7 - 1 Concrete blocks shall be approved concrete blocks - sound, true to shape and dimensions with sharp arrises, clean and undamaged.

7 - 2 Store blocks under cover on planks to keep them dry.

7 - 3 Cement shall be Portland cement complying with requirements of NZS 43, properly stored and handled at all times so as to be protected from moisture.

7 - 4 Fine aggregate (sand) shall be clean, coarse silicious and free from silt, salt, organic or other deliterious material.

7 - 5 Mortar shall have a minimum crushing strength of 135 kg/cm^2 at twenty eight days.

7 - 6 Water supply shall be clean water, and free from organic matter or suspended materials.

7 - 7 Provide and build in block reinforcement as indicated on drawings.

7 - 8 Build in bolts, tees, lugs, pipes, conduits, and fittings required by other trades.

7 - 9 Erect concrete blockwalls in positions and heights, thicknesses, etc., as indicated on drawings.

7 - 10 Size of concrete blocks shall be 390 x 190 x 190mm nominal hollow blocks, complying with JISA - 5406.

7 - 11 All joints shall be 10mm fully filled and struck on all faces with concave jointer.

7 - 12 On completion all blockwork shall be cleaned down and left perfectly free from cement, mortar marks or other blemishes to satisfaction of the Supervisor.

7 - 13 All debris, rubbish etc., shall be removed from the site.

8. CARPENTRY

8 - 1 All work shall be in accordance with best and latest trade practice and requirements of NZS 1900 chapter 9.1 and NZS3603:1981.

8 - 2 All exposed timbers shall be planed and primed before fixing and all inside work shall be hand dressed and glass papered to smooth furface.

8 - 3 All exposed nailing shall be carefully punched and all bruises and tool marks shall be removed. Timber which is split or hammer marked shall be replaced.

8 - 4 All timber shall be free from shakes, loose knots and gumstreaks. Substandard or warped timber shall be removed from the site as directed by the Supervisor.

8 - 5 All timber shall be thoroughly seasoned or kiln dried. Framing timber moisture content less than 20%. Finishing timber moisture content less than 18%.

8 - 6 All framing and exterior finishing timber shall be tanalised.

8 - 7 Stack all framing timber, sarking and weatherboards on skids and cover with tarpaulins. All finishing lines shall be stored in sheds or inside the closed-in building.

8 - 8 All nail plates and anchoring devices such as truss saddles, framing brackets, multi-grips and jamb fixing brackets shall be used in accordance with "PRYDE".

8 - 9 All nails shall be of approved manufacture, pattern length and gauge. Nails shall be used in adequate numbers to securely fix all timbers in accordance with best trade practice and the requirements of NZS 1900 Chapter 9.1.

8 - 10 All screws shall be of approved manufacture, of proper gauge and length and shall match metal of fitting.

8 - 11 All metal fastenings, nails, bolts, nuts, washers etc. shall be galvanised after manufacture.

8 - 12 Only timber of the following species shall be used.
All framing and interior finishing;Pinus radiata or Douglas fir.

8 - 13 All timber in contact with concrete shall be separated with 3 ply malthoid D.P.C.

8 - 14 The carpenter shall attend upon all trades. He shall co-ordinate their work and determine their timing and sequence of operations. He shall supply them with all work required by Architectural plans and details.

8 - 15 All fascia shall be accurately scarfed at joints and mitred at angles and in long lengths.

8 - 16 Glaze louvre frames with 5mm drawn sheet glass with ground and polished edges and tightly crimp louvre channels to hold glass in position without rattling, where shown on drawings.

8 - 17 Glass throughout shall be gree of blemishes and flaws and of the best quality of their respective kind.

8 - 18 Glass panes in fixed glass windows and doors shall be bedded in approved putty and fixed with the wood beads as shown on details.

9. JOINERY

9 - 1 All dimensions shall be confirmed on site by the Contractor before fabrication of any joinery units.

9 - 2 All exposed timber, plywood and coreboard shall be clean selected grades, veneered with selected veneers where applicable. All timber shall be kiln dried to 15% maximum moisture content and dry dressed.

9 - 3 All joinery shall be made in strict accordance with drawings and shall be of a high quality and any substandard items shall be rejected.

9 - 4 The whole of the joinery shall be constructed to best trade practice. All joints shall be mortice and tenon, dovetail, tongue and groove, mitred as required and shall be well flushed with approved glue.

9 - 5 All joinery shall be hand finished with glass paper with arrises removed. Any work showing plane or hammer marks, bruises, or scratches shall be rejected.

9 - 6 All nail holes shall be carefully punched and left for stopping.

Doors shall be as shown on drawings (DOOR AND WINDOW SCHEDULE).

9 - 7 All windows shall be provided as shown on drawings.

9 - 8 Allow for supply and fixing of all hardware for doors and windows. Refer DOOR AND WINDOW SCHEDULE.

10. ROOF AND GUTTER WORK

10 - 1 The Work consists principally of 24 gauge Klip-Lok Colorbond roofing.

10 - 2 All materials and workmanship are to be the best of their respective kinds.

10 - 3 The Contractor shall provide all jointing materials, solder, nails, screws, wedges, etc., to make all roof completely watertight.

10 - 4 The whole of the Klip-Lok Colorbond roof is to be sheeted with sisalation 420.

10 - 5 Regarding the lapping part of the colorbord roof sheet, oil paint shall be applied to the each side in contact.

11. METAL WORK

11 - 1 Steel pipes as detailed shall be galvanised prior to use.

11 - 2 Provide and fix brackets, angles and the other metal pieces as indicated on drawings, hot dip galvanised and fixed with galvanised bolts, screws etc.

11 - 3 All cutting and shearing shall be neatly done and all portions exposed to view neatly finished.

12. PAINT WORK

12 - 1 All finishing tints shall be selected by the Supervisor.

12 - 2 The Contractor shall use type of paint as per Schedule of Finishes, or as shown on drawings, and shall allow for the use of various colours and tints for all paint work as specified.

12 - 3 When required samples shall be set up for the approval of the Supervisor before final coats are applied.

12 - 4 Paint and other materials shall be in good condition when used and thoroughly mixed before commencing work.

12 - 5 Different brands and/or types of material shall not be intermixed and all containers shall be properly sealed at the end of each day's work.

12 - 6 Inaccessible areas are to be primed before erection.

12 - 7 No painting shall be done in unsuitable (dusty or wet) weather. Paint on dry surfaces. Comply with manufacturer's instructions.

12 - 8 No paint shall be opened or mixed on floors of the building unless adequate protection is firstly agreed upon and then use.

12 - 9 All other work than that being painted shall be adequately protected with sheets, or other approved means.

12 - 10 Refer to Schedule of Finishes and to drawings for extent and location of painted surfaces.

12 - 11 All new woodwork shall be sandpapered smooth, knotted, primed, and stopped where to be painted and filled where to be polished.

12 - 12 Each coat of paint shall be rubbed down before the next coat is applied.

12 - 13 All damaged surfaces shall be properly repaired.

13. FLOOR FINISHING AND TILE WORK

13 - 1 All floor finishes shall be supplied and laid by firms approved by the Supervisor.

13 - 2 The Contractor shall be responsible for finishing floors flush with all margins against which they abut.

13 - 3 No floor finish is to be laid until all plastering has been completed.

13 - 4 Where different finishes occur on either side of a door, the junction shall be made under threshold or centre of the door, and the joint covered by 18mm wide aluminium strip or by 40mm wide stainless steel channel.

13 - 5 All surfaces of concrete floors to receive applied finishes shall be chipped and roughened, thoroughly cleaned and wetted before surface finish is placed.

The base slab shall then be treated with an adequate mixture of neat cement and water - the consistency of thick paste - well broomed into rough slab.

13 - 6 Samples of all manufactured materials used for the finishes shall be submitted to the Supervisor for approval and the colors shall be selected by the Supervisor in the course of the Work.

13 - 7 All ceramic tiles to be soaked in water for a minimum 24 hours prior to use.

13 - 8 The Contractor shall supply all sand, cement, scaffolding etc., as may be required to complete the works.

13 - 9 HICHINS FORMROK 210 shall be applied to floor coating as shown on drawings.
Apply in three coats to give an even finish over all and smooth furface.

14. PLUMBING AND DRAINAGE

14 - 1 The whole of the plumbing is to be carried out in accordance with the rules of local by-laws and New Zealand Drainage and Plumbing Regulations 1978, by a licensed plumber to best trade practices.

14 - 2 All piping is to be concealed where possible.

14 - 3 Any exposed tubing in toilets is to be chromium plated and fitted with C.P. flanges at walls.

14 - 4 Where tubes are embedded in hardfill or cast in concrete or blockwall, they shall be wrapped in anticorrosive type.

14 - 5 Sleeves for pipe passing through roof shall project above roof finishing and shall be watertight.

14 - 6 All back vents are to be PVC as indicated on drawings.

Carry the vent through roof and finish with cowls.

14 - 7 Brass floor traps to have C.P. screwed gratings spiggoted and socketed, jointed to approval.

14 - 8 All tubing buried in the ground and concrete or blockwall shall be PVC.

14 - 9 All PVC pipes shall be fitted in accordance with the PINZ Cod of Practice for installation of unplasticised PVC pipe systems.

14 - 10 Carry out whole of water services to sizes and various pipe runs in the positions shown on the drawings, connected to all outlets complete with gate valves, stop cooks, compression fittings for joints, tees, bends, reducing pieces and clips.

14 - 11 All water pipes shall be set straight or to an even gradient, avoiding all places where air locks are likely to occur.

Easy bends shall be used throughout.

15. ELECTRICAL WORKS

1. Range of work and standards of installation.
Items not noted in this technical specification and electrical drawings shall be based on the Handbook to the electrical wiring regulations, 1976 (prepared by Electrical Division, ministry of Energy of New Zealand.) and the Fire Services Act based on British Standard.

2. Flash Plates
Assortment; Square shaped metal plates.
Note ; The plates of junction box shall be used circular one.

3. Leading in Wire
Conduits (Reserve conduits) which do not carry electrical wires shall carry a vinyl covered steel wire of at least 1.2mm in diameter.

4. Mounting height for equipment.
Mounting height for equipment shall be based on the following list, however they may be altered at the direction of the supervisor.

Equipment	Measured form	to Height (mm)
Distribution board	floor-upper edge	1,800
Lighting swiches	floor-center	1,300
Receptacles(ordinary)	Do	300
Do (stage)	on stage-center	150
Wall lights(above mirrors)	mirror edge-center	150
Telephone outlets	floor-center	300
Fire alarm control panel	floor-upper edge	1,800
Fire alarm bell	floor-center	2,100
Manual station	Do	1,300

Items of electrical works

1. Repair of existing subustation
2. Feeder instalation
3. Lighting and Receptacle equipment
4. Lighting fitting equipment
5. Telephone piping installation
6. Fire alarm equipment

DRAWINGS

EXTENSION OF
THE HEALTH LABORATORY OF
VAIOLA HOSPITAL, TONGA.

JAPAN INTERNATIONAL COOPERATION AGENCY

ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.

NAME OF PROJECT	: EXTENSION OF THE HEALTH LABORATORY OF VAIOLA HOSPITAL
SITE	: VAIOLA HOSPITAL NUKU'ALOFA TONGATAPU, THE KINGDOM OF TONGA
OUTLINE OF BUILDING	: A REINFORCED CONCRETE BLOCK WALL, TIMBER TRUSS ROOF, ONE STORIED BUILDING
	FLOOR AREA : 595.45 M^2 (INCLUDING NEW WALKWAY)
SCOPE OF WORKS	: BUILDINGS AND INCIDENTAL FACILITIES SHOWN ON DRAWINGS
ITEMS NOT INCLUDED IN THE WORK	: • LABORATORY FURNITURE • AIR-CONDITIONER • CEILING FAN • GAS CYLINDER (L.P.G)
EXTERIOR FINISH SCHEDULE	
FOUNDATION WALL	: MORTAR TROWELLED
EXTERIOR FLOOR	: MORTAR TROWELLED
WALL	: CONCRETE WALL : CONCRETE INTEGRAL FIN. SPRAYED AVP. & MORTAR TROWELLED. SPRAYED AVP : CONCRETE BLOCK WALL : FAIR FACED DECORATIVE LAYING
ROOF	: WOODEN CONSTRUCTION (TIMBER TRUSS), KLIP-LOK #24 COLORBOND ROOF ON SARKING FELT
FASCIA BOARD	: WOODEN BOARD SHIPLAP JOINT OP.
SOFFIT	: WOODEN BATTENS W/50 mm WIDE GAPS OP. UNDER VERMINE PROOF COPPER WIRE MESH & HARDIFLEX 4.5 mm VP.
WINDOW	: GLASS LOUVRE WINDOW (ALUMINUM) & ALUMINUM HORIZONTAL SLIDING WINDOW
DOOR	: WOODEN DOOR OP.
FRAMES OF WINDOW & DOOR	: WOODEN FRAME OP.
PAINT SYSTEM	: WOODEN SURFACE : 3 COATS INCLUDING PRIMER COAT. METAL SURFACE : 2 COATS.

ABBREVIATION

A V P : ACRYLIC VINYL PAINT
V P : VINYL PAINT
O P : OIL PAINT

LIST OF DRAWINGS — A : ARCHITECTURAL, S : STRUCTURAL, E : ELECTRICAL, M : MECHANICAL

A - 1 OUTLINE OF BLDG. FINISH SCHEDULE
A - 2 LOCATION MAP, PLOT PLAN, FLOOR AREA
A - 3 FLOOR PLAN, ROOF PLAN,
A - 4 ELEVATION, SECTION
A - 5 CROSS SECTION
A - 6 DETAIL OF PLAN (1)
A - 7 DETAIL OF PLAN (2)
A - 8 INTERIOR ELEVATION (1)
A - 9 INTERIOR ELEVATION (2)
A - 10 INTERIOR ELEVATION & DETAILS
A - 11 CEILING PLAN
A - 12 DOOR & WINDOW SCHEDULE (1)
A - 13 DOOR & WINDOW SCHEDULE, DETAILS

S - 1 FOUNDATION PLAN
S - 2 ROOF FLOOR BEAM PLAN
S - 3 ROOF FRAMING PLAN
S - 4 FRAMING ELEVATION
S - 5 FOUNDATION, GIRDER, BEAM, COLUMN & DETAILS.

E - 1 PLOT PLAN
E - 2 FEEDER INSTALLATION PLAN
E - 3 LIGHTING & RECEPTACLE EQUIPMENT PLAN
E - 4 RECEPTACLE EQUIPMENT
E - 5 LIGHTING FITTING & DISTRIBUTIONBOARD DIAGRAM
E - 6 FIRE ALARM EQUIPMENT PLAN

M - 1 PLUMBING PLAN & EQUIPMENT LIST
M - 2 HOT WATER PIPING
M - 3 AIR CONDITION & VENTILATION EQUIPMENT

INTERIOR FINISH SCHEDULE

ROOM	FLOOR	BASEBOARD	WALL	CEILING	HEIGHT	REMARKS
REGISTRY	MORTAR TROWELLED VINYL TILE	VINYL BASE	PLASTER TROWELLED V.P	HARDIFLEX 4.5 mm VP W/HARDITOINTER	2900	
OFFICE 1, 2, 3	DITTO	DITTO	DITTO	DITTO	"	
CONFERENCE	DITTO	DITTO	DITTO	DITTO	"	
LIBRARY	DITTO	DITTO	DITTO	DITTO	"	
CONTINUING EDUCATION	DITTO	DITTO	DITTO	DITTO	"	
WATER LABORATORY	MORTAR TROWELLED FORMROK 201 4.5 mm	FORMROK 201 4.5 mm	DITTO	DITTO	"	
FOOD LABORATORY	DITTO	DITTO	DITTO	DITTO	"	
MEDIA PREPARATION	DITTO	DITTO	DITTO	DITTO	"	
MICROBIOLOGY LABORATORY	DITTO	DITTO	DITTO	DITTO	"	
T.B LABORATORY	DITTO	DITTO	DITTO	DITTO	"	
BULK STORE	MORTAR TROWELLED VINYL TILE	VINYL BASE	DITTO	DITTO	"	
DIRTY WASHING & STERILIZATION	QUARRY TILE 150 × 150 mm		GLAZED CERAMIC TILE 150×150 H=1700 PLASTER TROWELLED V.P.	DITTO	"	
CLEAN STERILE GLASS STORE	MORTAR TROWELLED VINYL TILE	VINYL BASE	PLASTER TROWELLED V.P	DITTO	"	
INSTRUMENT	DITTO	DITTO	DITTO	DITTO	"	
LOCKER RM.	DITTO	DITTO	DITTO	DITTO	"	
TOILET	QUARRY TILE 150 × 150 mm	GLAZED CERAMIC TILE 150×150 H=150mm	DITTO	DITTO	"	
CORRIDOR	MORTAR TROWELLED VINYL TILE	VINYL BASE	DITTO	DITTO	2550	
GAS CYLINDER RM.	CONCRETE TROWELLED FINISH		FAIR FACED CONC. BLOCK & CONC. INTEGRAL FIN.	HARDIFLEX 4.5 mm W/ HARDITOINTER	---	
ELECTRIC PANELBOARD RM.	DITTO		DITTO	DITTO	---	

JAPAN INTERNATIONAL COOPERATION AGENCY

NO.	TITLE OF THE PROJECT	
MTE 82-10	Extension of The Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO.	DRAWING NAME	SCALE
A - 1	OUTLINE OF BLDG. FINISH SCHEDULE	

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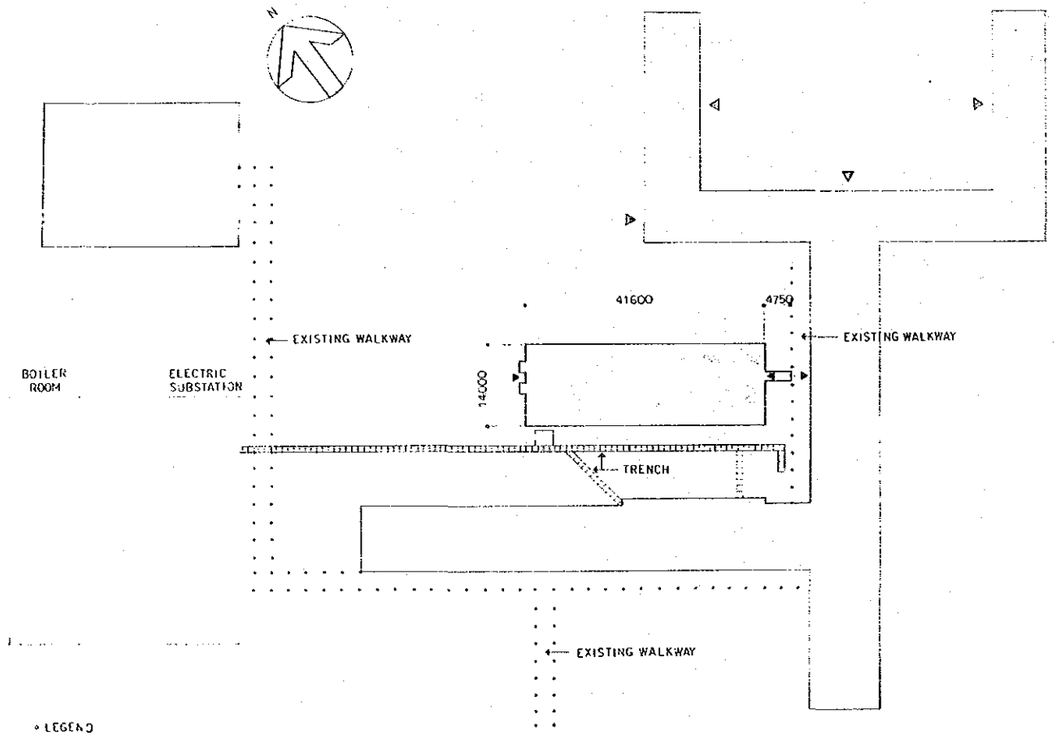
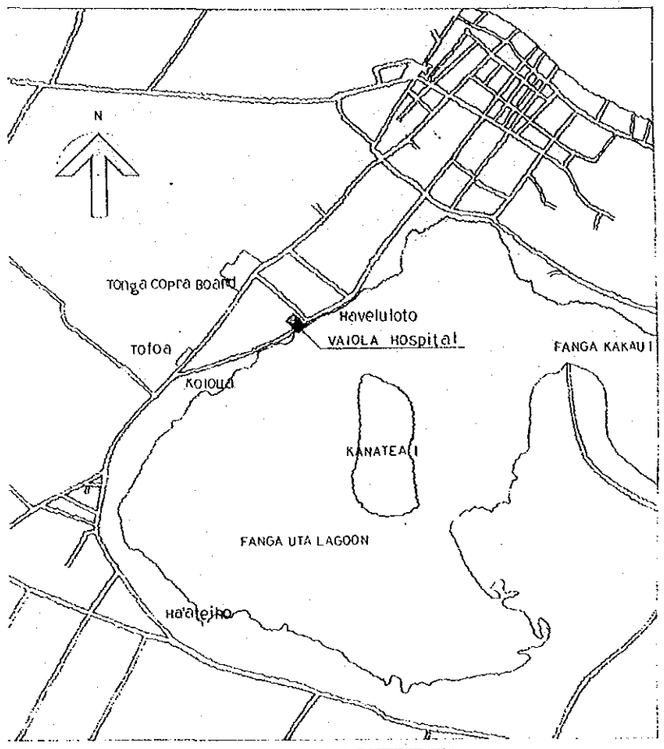
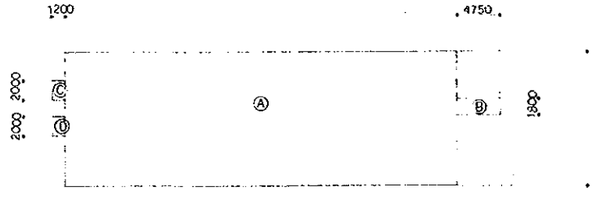


PLOT PLAN 1/500



LOCATION MAP 1/25000

FLOOR AREA 1/300



41600

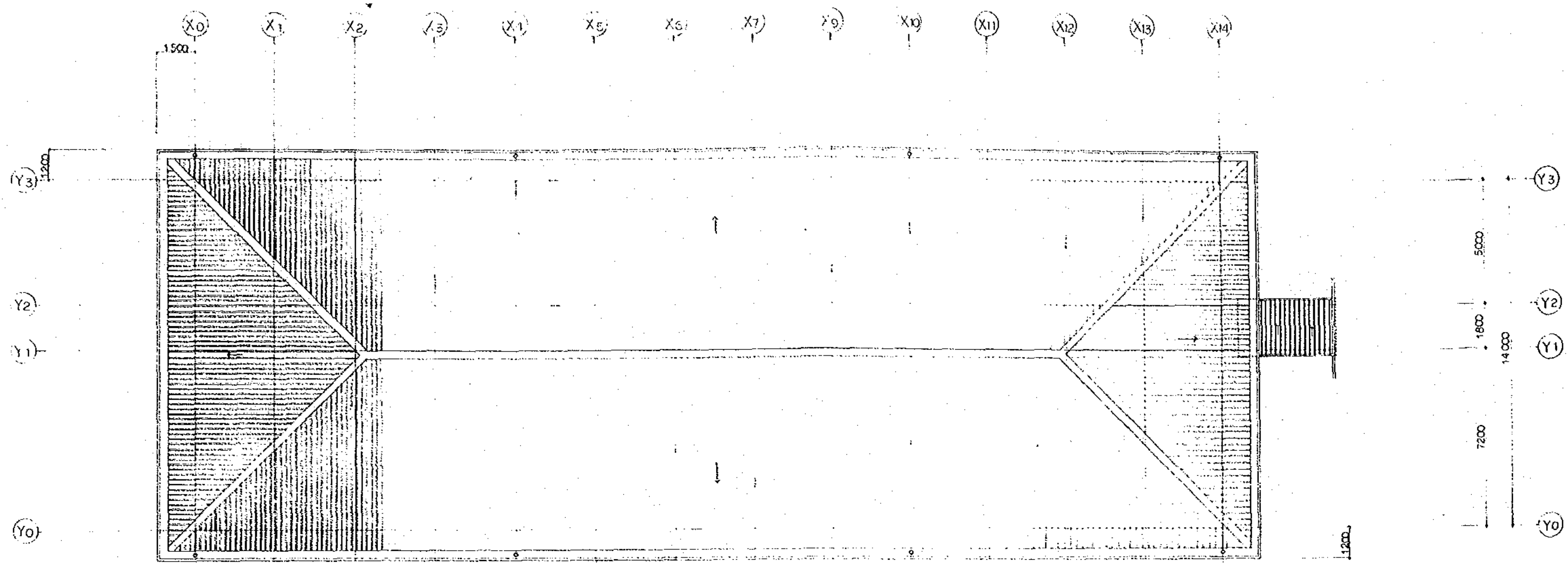
Ⓐ	41,600	x	14000	582400
Ⓑ	4,750	x	1,800	8,550
Ⓒ	2,000	x	1,200	2,400
Ⓓ	2,000	x	1,200	2,400
TOTAL				595,750 m²

JAPAN INTERNATIONAL COOPERATION AGENCY

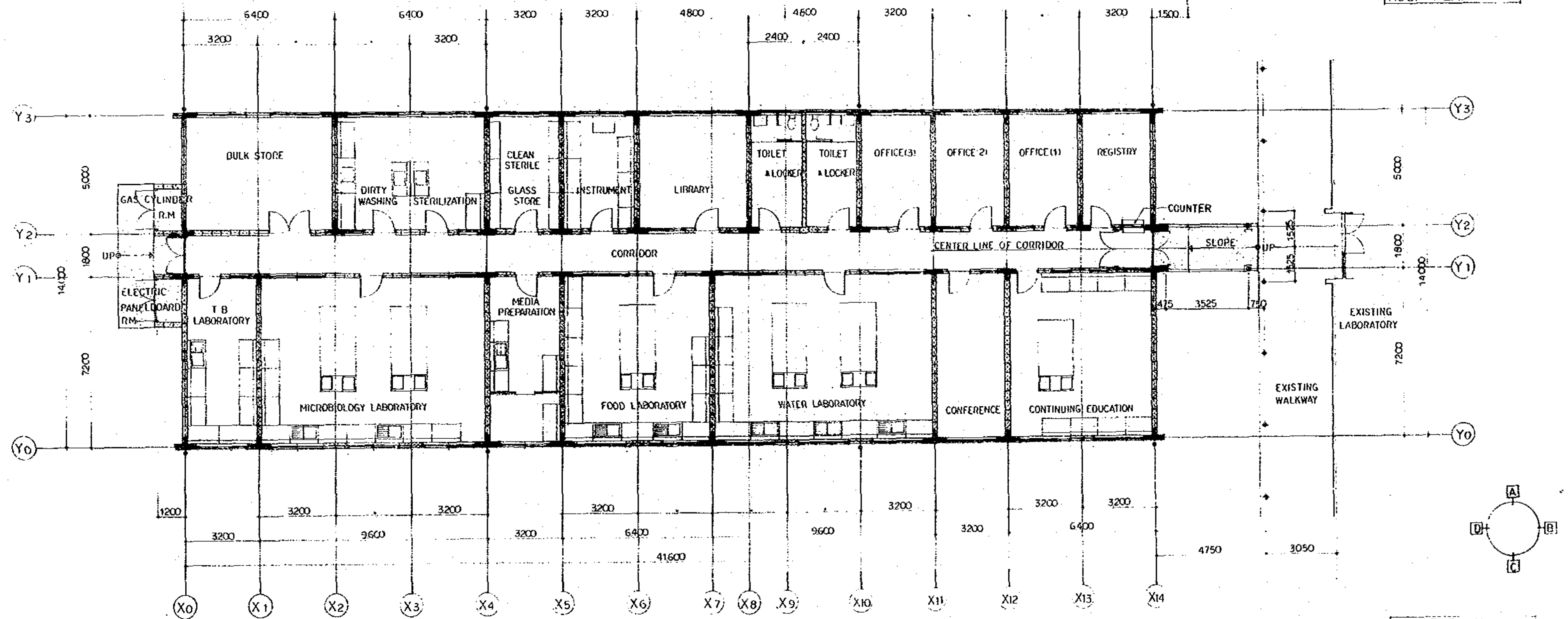
NO.		
RCE 82-10		Extension of The Health Laboratory of Vaiola Hospital, Tonga.

DRAWING NO.	DRAWING TITLE	SCALE
A-2	LOCATION MAP. PLOT PLAN. FLOOR AREA	

ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM INC.

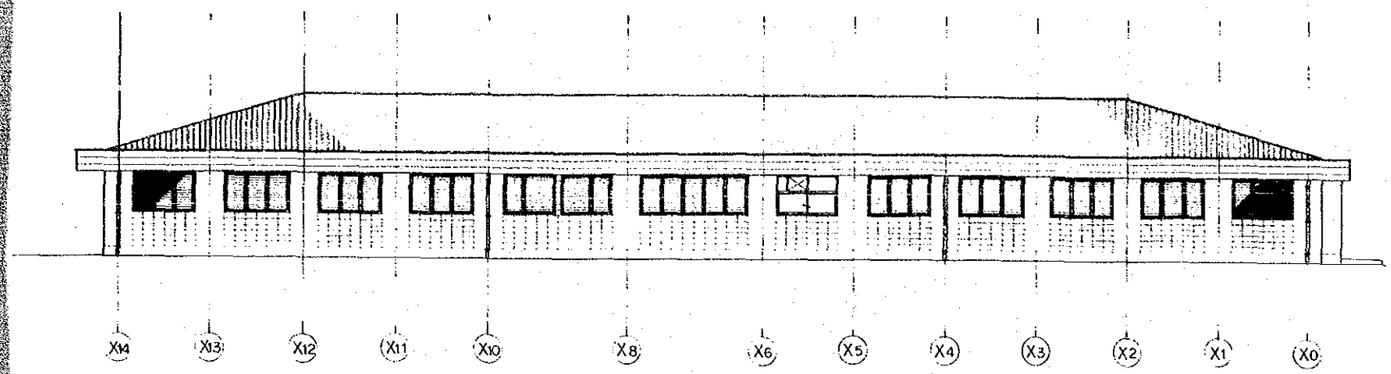


ROOF PLAN S 1/100

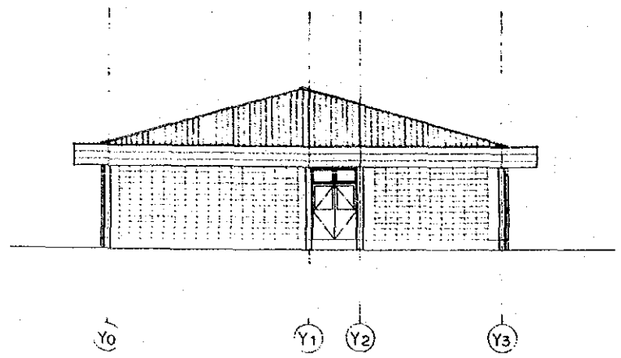


FLOOR PLAN S 1/100

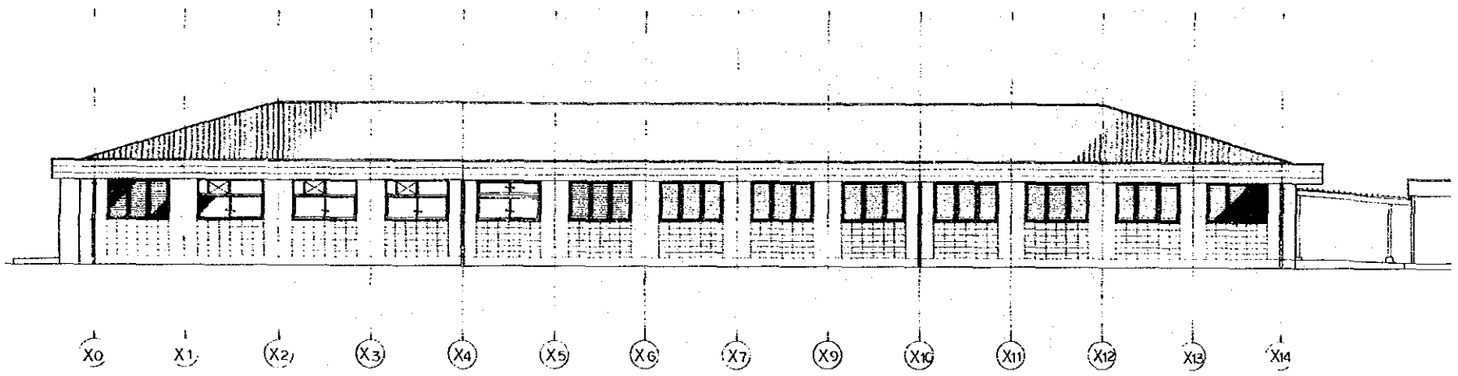
JAPAN INTERNATIONAL COOPERATION AGENCY		
JOB NO MCF 82-16	Extension of The Health Laboratory of Vaiola Hospital, Tonga.	1/100
DRAWING NO A-3	FLOOR PLAN. ROOF PLAN.	
June '82		K.H



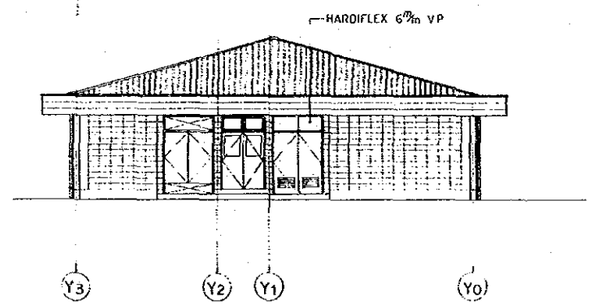
ELEVATION N S1/100



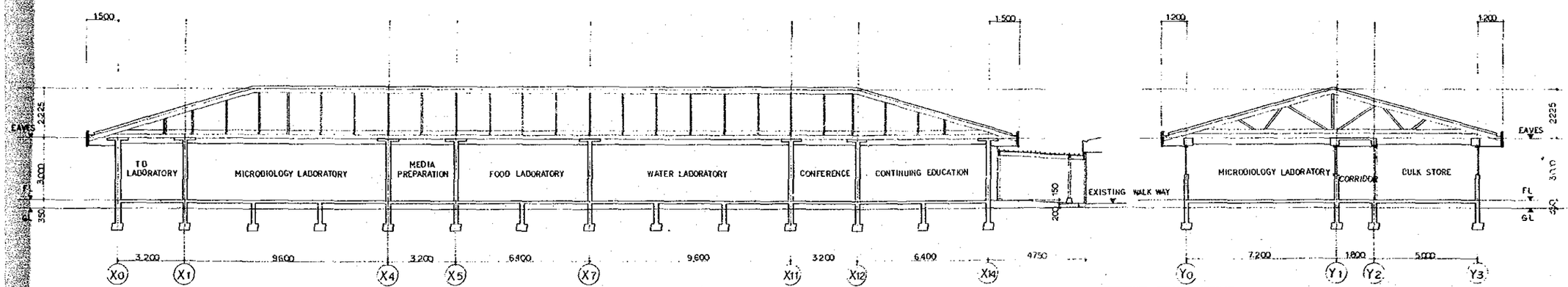
ELEVATION E S1/100



ELEVATION S S1/100



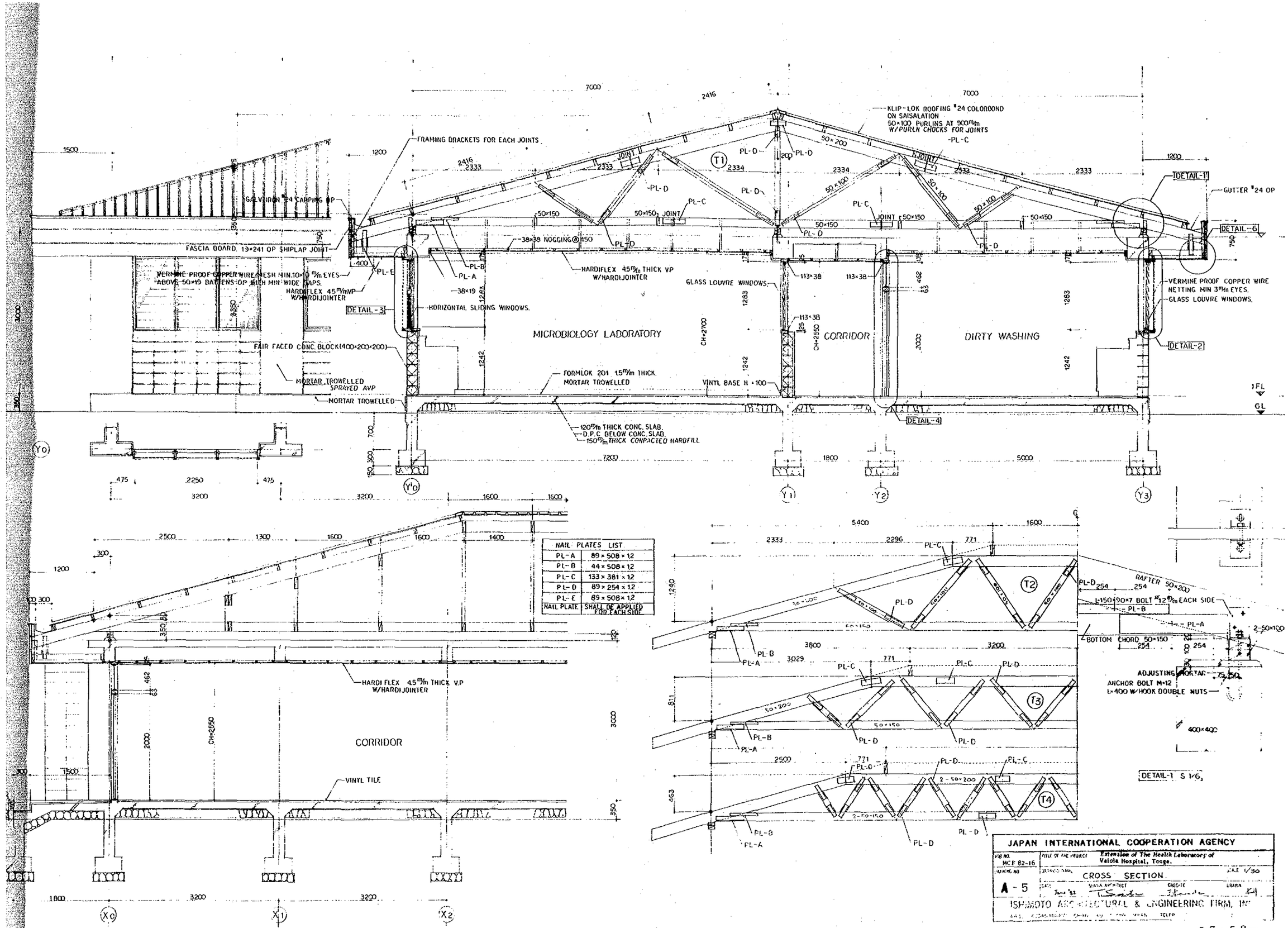
ELEVATION W S1/100



SECTION a - a S1/100

SECTION b - b S1/100

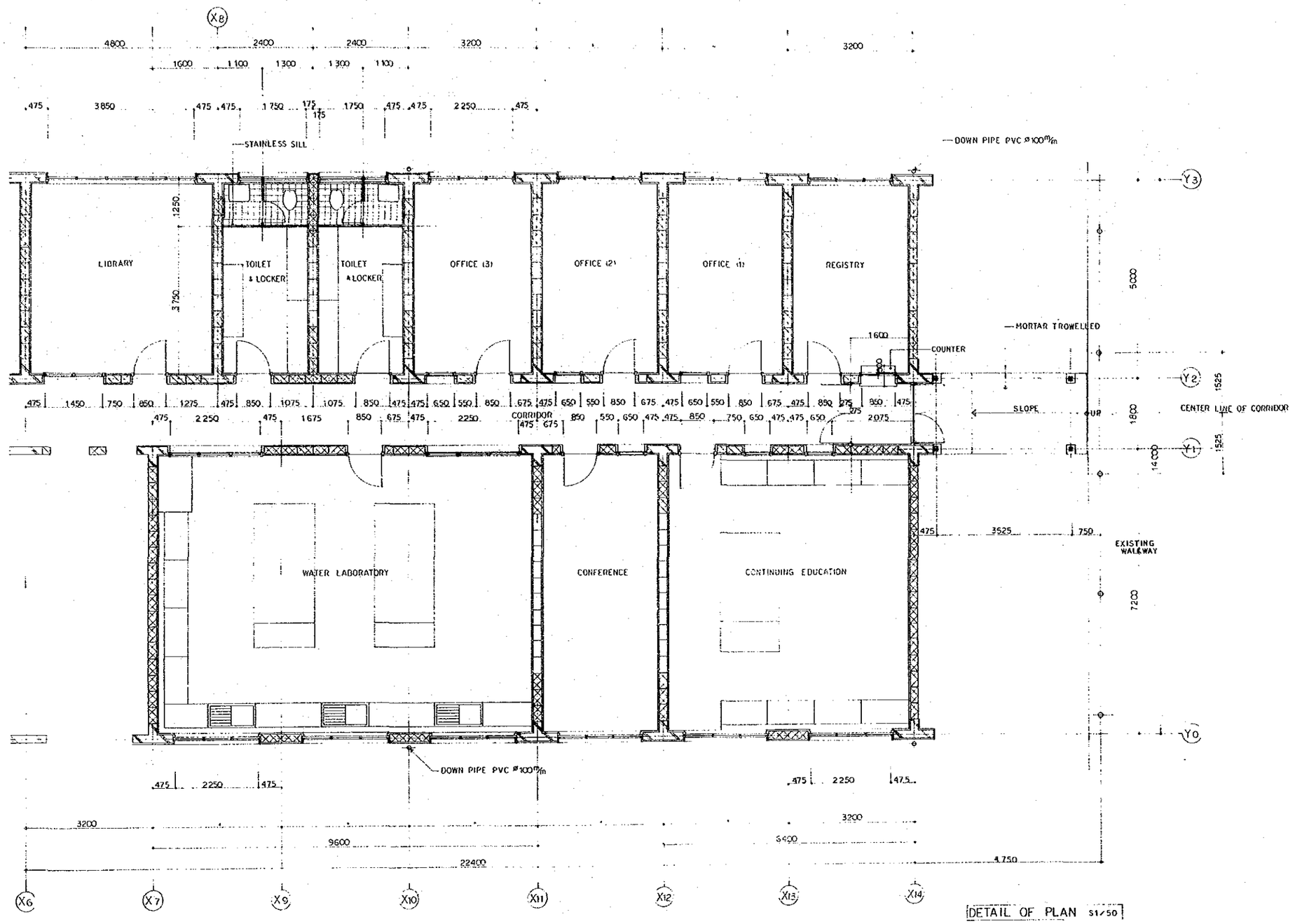
JAPAN INTERNATIONAL COOPERATION AGENCY			
JOB NO. MCIP 82-16	TITLE OF THE PROJECT: Extension of The Health Laboratory of Vaiola Hospital, Tonga.		
DRAWING NO. A-4	DRAWING NAME: ELEVATION. SECTION.	SCALE 1/100	
	DATE June '84	SIGNED BY ARCHT.	CHECKED T.Kawai
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.			



JAPAN INTERNATIONAL COOPERATION AGENCY

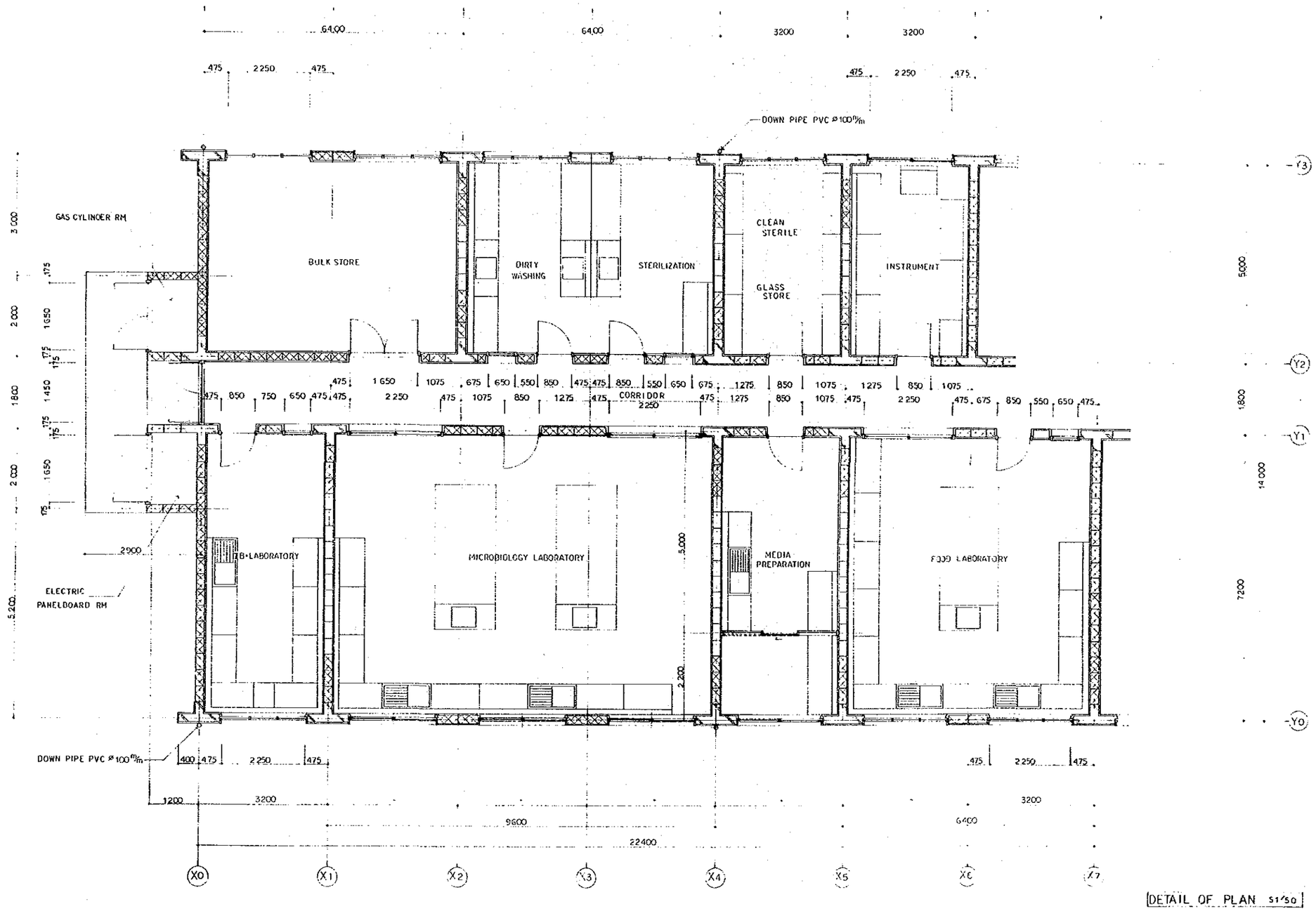
JOB NO.	TITLE OF THE PROJECT	
MCF 82-16	Extension of The Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO	DRAWING NAME	SCALE
A-5	CROSS SECTION	1/30

ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC



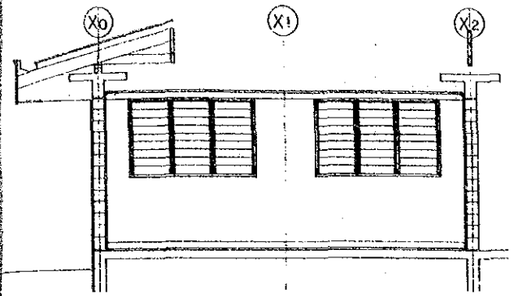
DETAIL OF PLAN S1/50

JAPAN INTERNATIONAL COOPERATION AGENCY			
JOB NO. NCF 82-16	TITLE OF THE PROJECT	Extension of The Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO. A-6	DRAWING NAME	DETAIL OF PLAN (1)	SCALE 1/50
	DATE June '83	SENIOR ARCHITECT	CHECKED T. Kimura
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.			

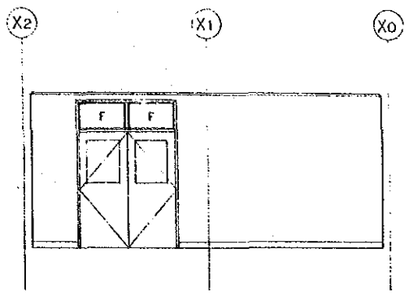


DETAIL OF PLAN 1/50

JAPAN INTERNATIONAL COOPERATION AGENCY			
JOB NO. HCF 82-16	TITLE OF THE PROJECT	Extension of The Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO. A-7	DRAWING NAME	DETAIL OF PLAN (2)	SCALE 1/50
	DATE June'83	SENIOR ARCHITECT T. Saito	CHECKED T. Kuwa	DRAWN K.H
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.			
6-6-12, KUDAN-MINAMI, CHIYODA-KU, TOKYO, JAPAN TELEPHONE TOKYO (03) 262-7351			



BULK STORE [A]



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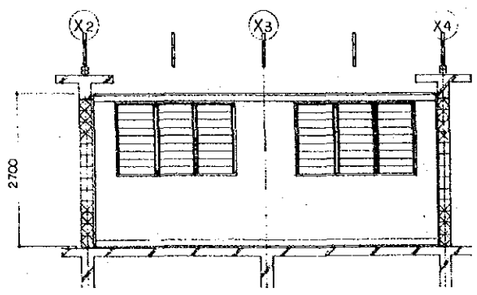
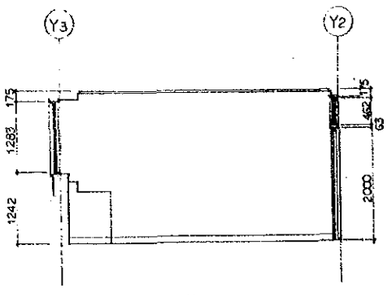


DIRTY WASHING・STERILIZATION [A]



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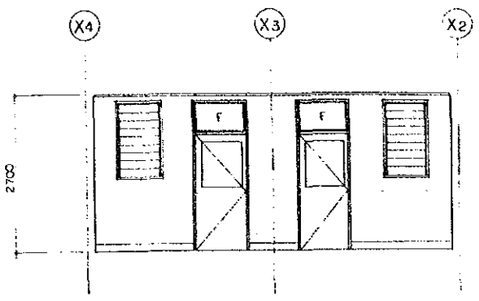

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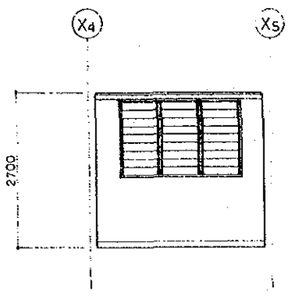
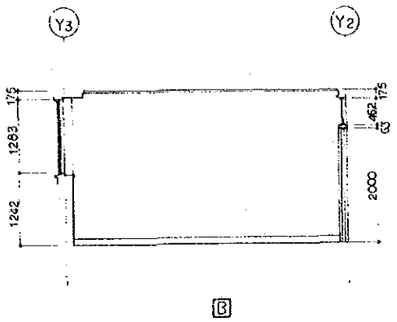


CLEAN STERILE・GLASS STORE [A]



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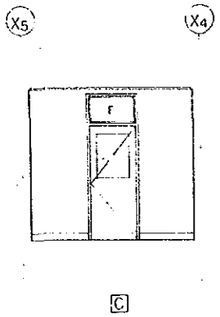

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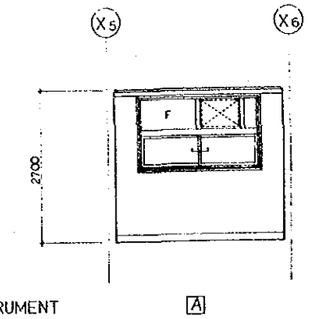
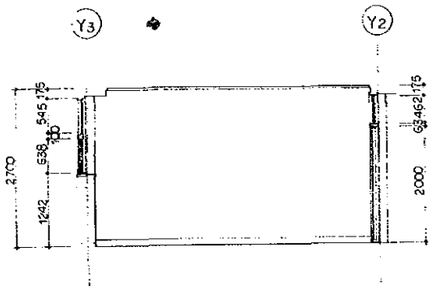


INSTRUMENT [A]



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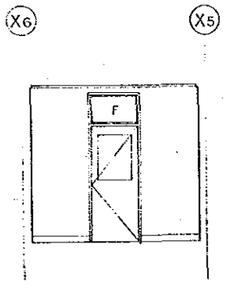

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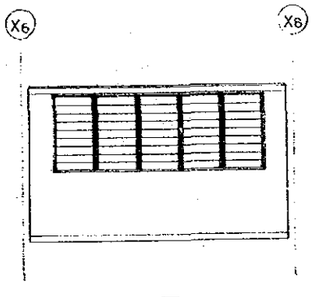

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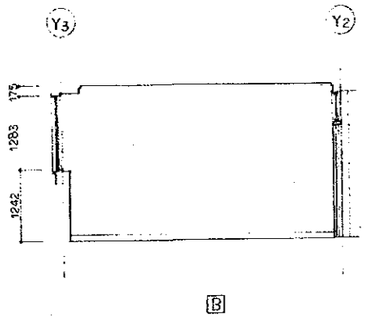

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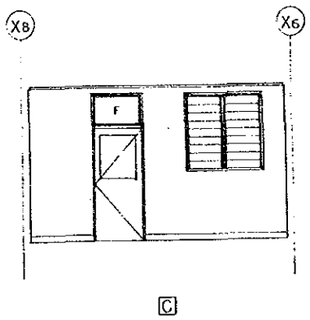
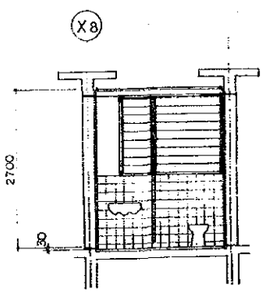
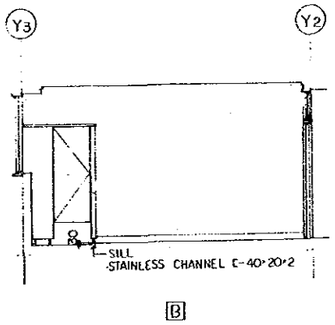


[C]

LIBRARY



TOILET & LOCKER [A]



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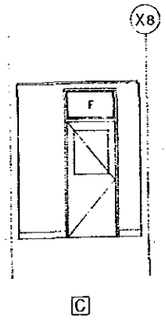

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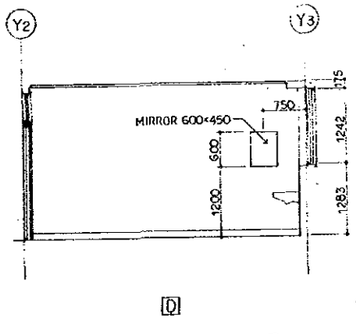

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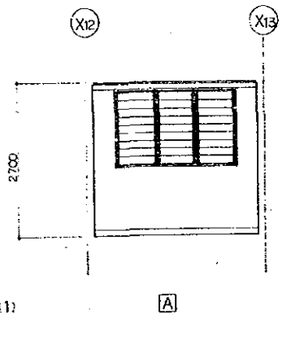
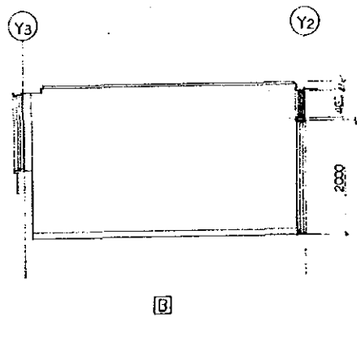


OFFICE (1) [A]



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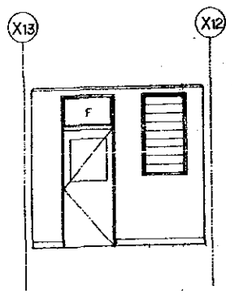

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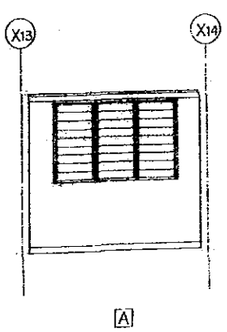

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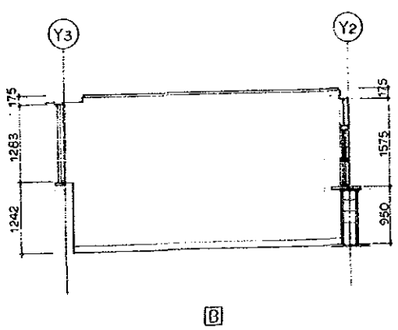

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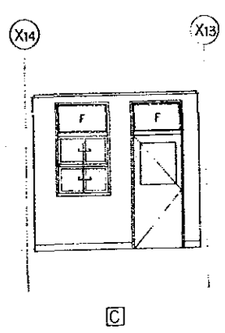
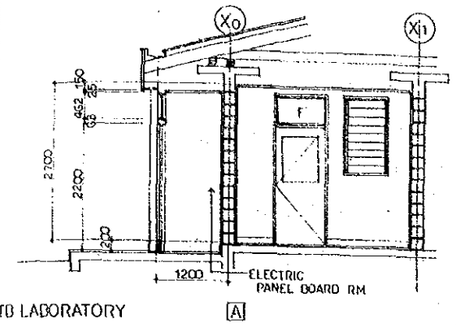


[C]

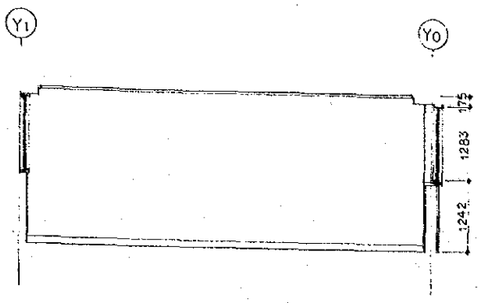
REGISTRY

JAPAN INTERNATIONAL COOPERATION AGENCY			
JOB NO. MCF 82-16	TITLE OF THE PROJECT	Expansion of the Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO. A-8	DRAWING NAME	INTERIOR ELEVATION (1)	SCALE 1/50
	DATE June '83	SENIOR ARCHITECT	CHECKED / DRAWN KH

ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.
1612, MISAKI-MINAMI, CHIYODA-KU, TOKYO, JAPAN TELEPHONE: TOKYO (03) 262-1161

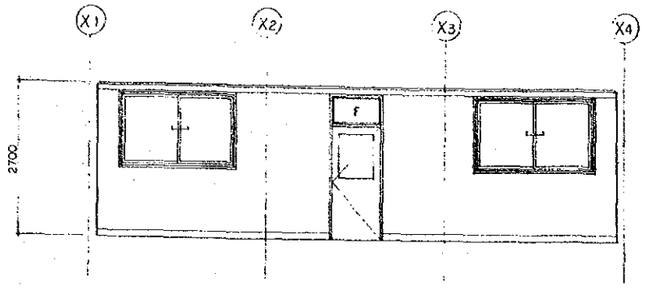


TO LABORATORY [A]

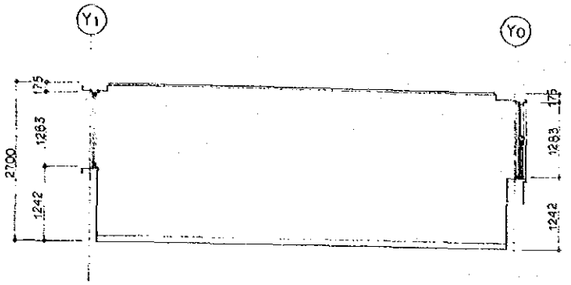


[B]

[C]



MICROBIOLOGY LABORATORY [A]



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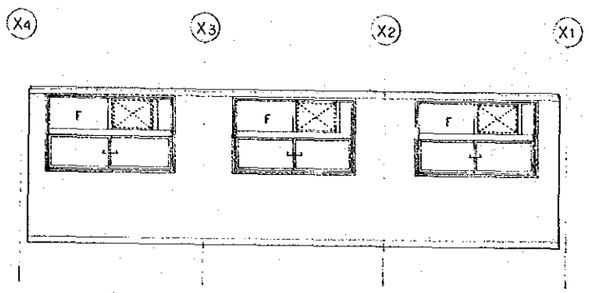

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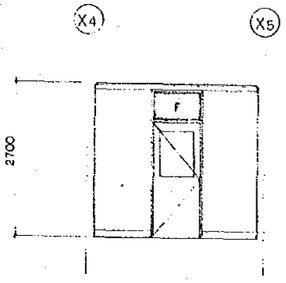
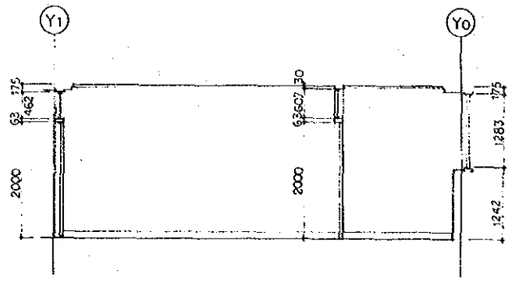
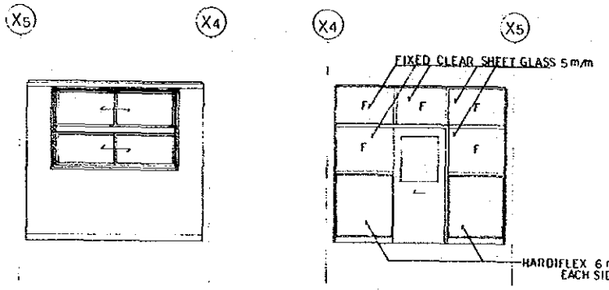
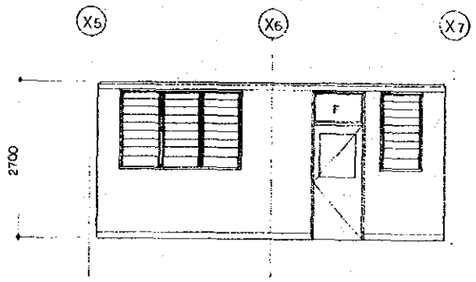




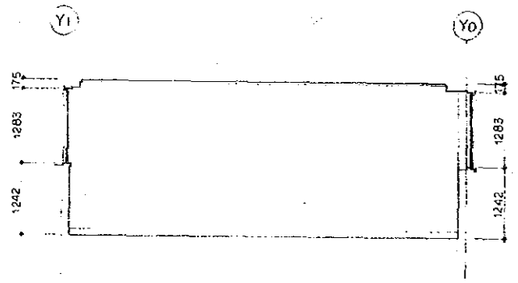
MEDIA PREPARATION [A] [B]



[C] [A]



FOOD LABORATORY. [A]



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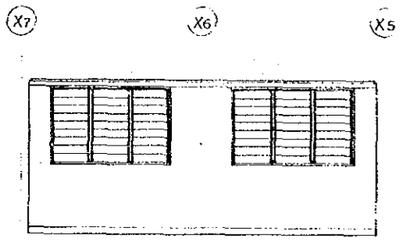

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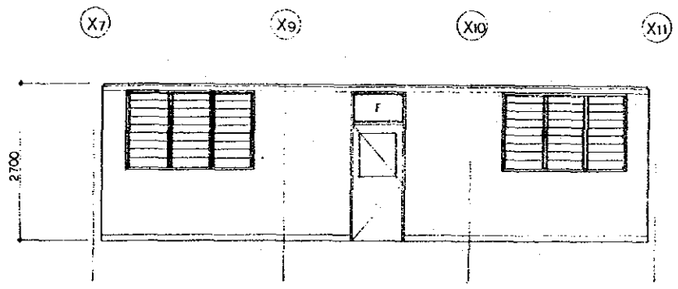
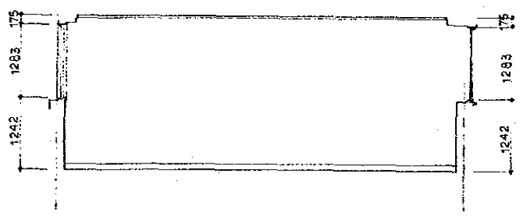


WATER LABORATORY [A]



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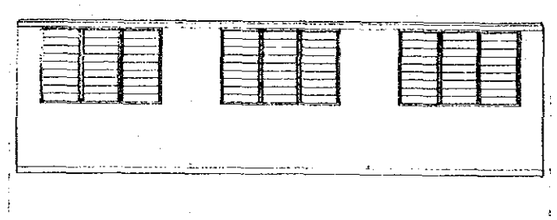
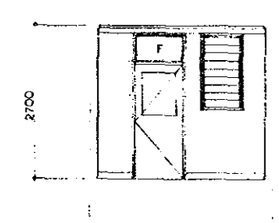
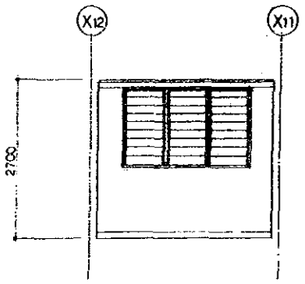




CONFERENCE [A]



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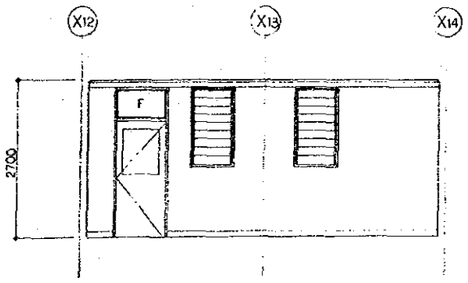
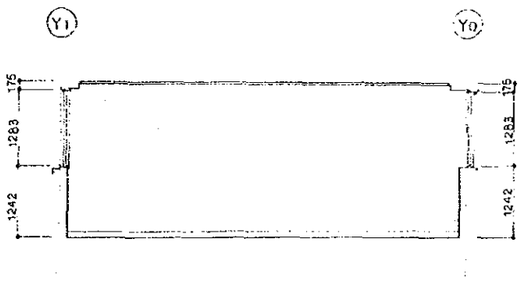


CONTINUING EDUCATION [A]



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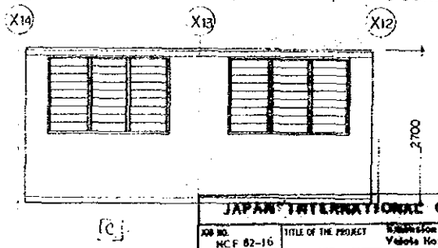
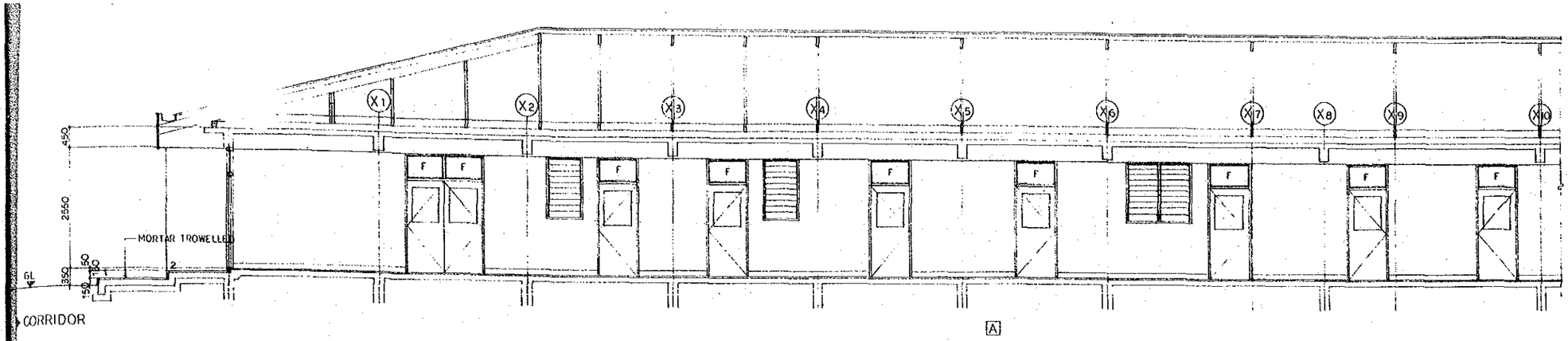


[C]

JAPAN INTERNATIONAL COOPERATION AGENCY			
JOB NO. NCF 82-16	TITLE OF THE PROJECT	Extension of The Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO. A - 9	DRAWING NAME	INTERIOR ELEVATION (2)	SCALE 1/50
	DATE June '83	SENIOR ARCHITECT T. Ishimoto	CHECKED T. Ishimoto
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.			
4612, YUGAN MINAMI, CHIYODA-KU, TOKYO, JAPAN TELEPHONE: TOKYO (02) 262 7151			



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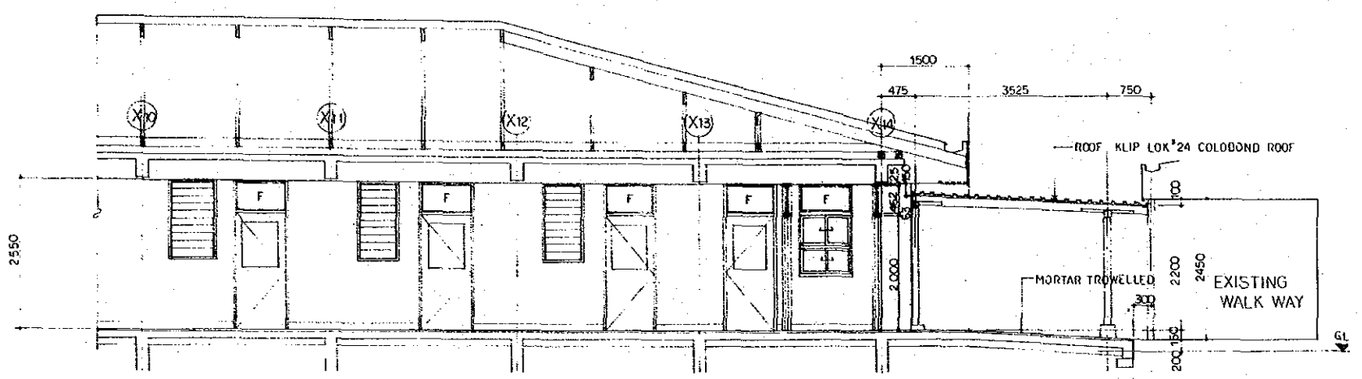

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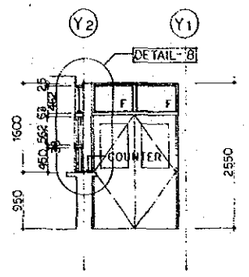

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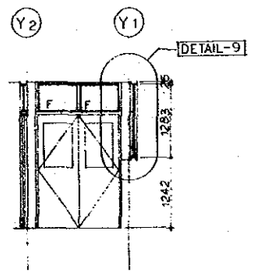

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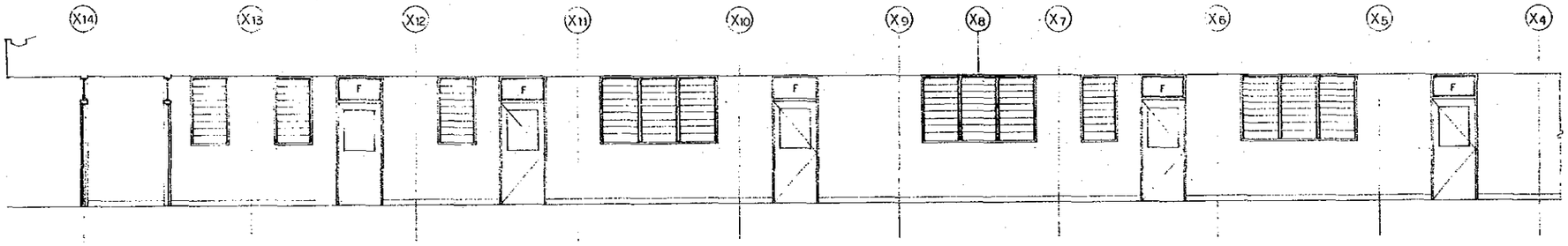

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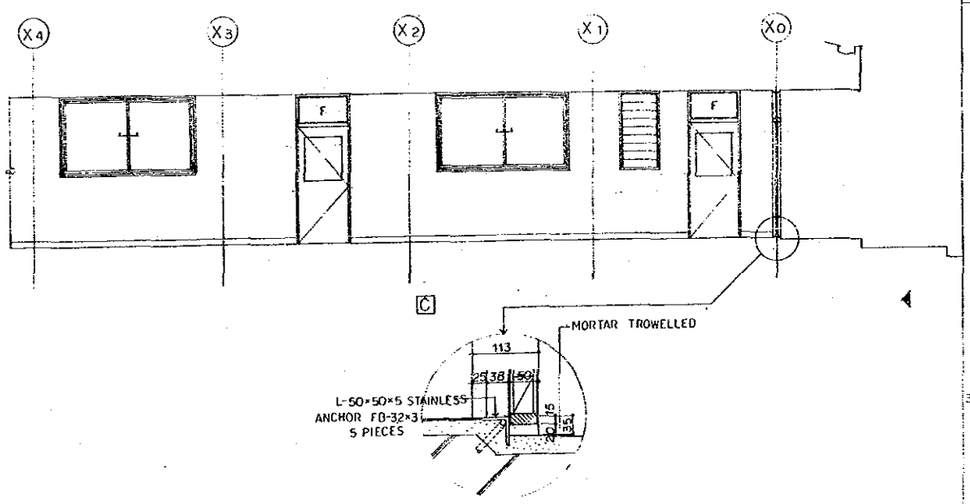
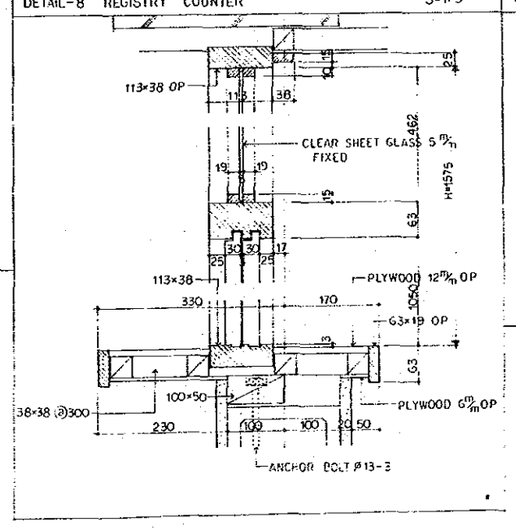
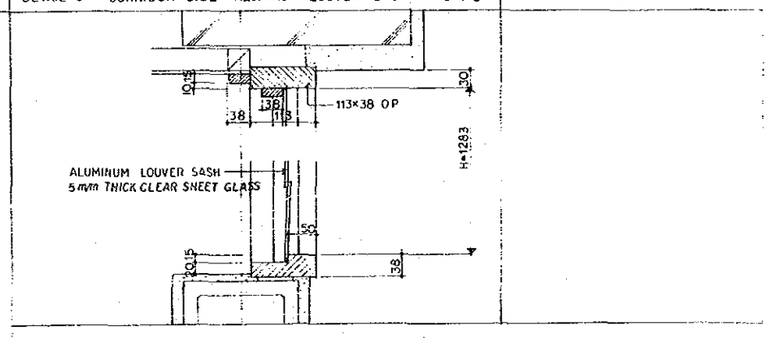


C

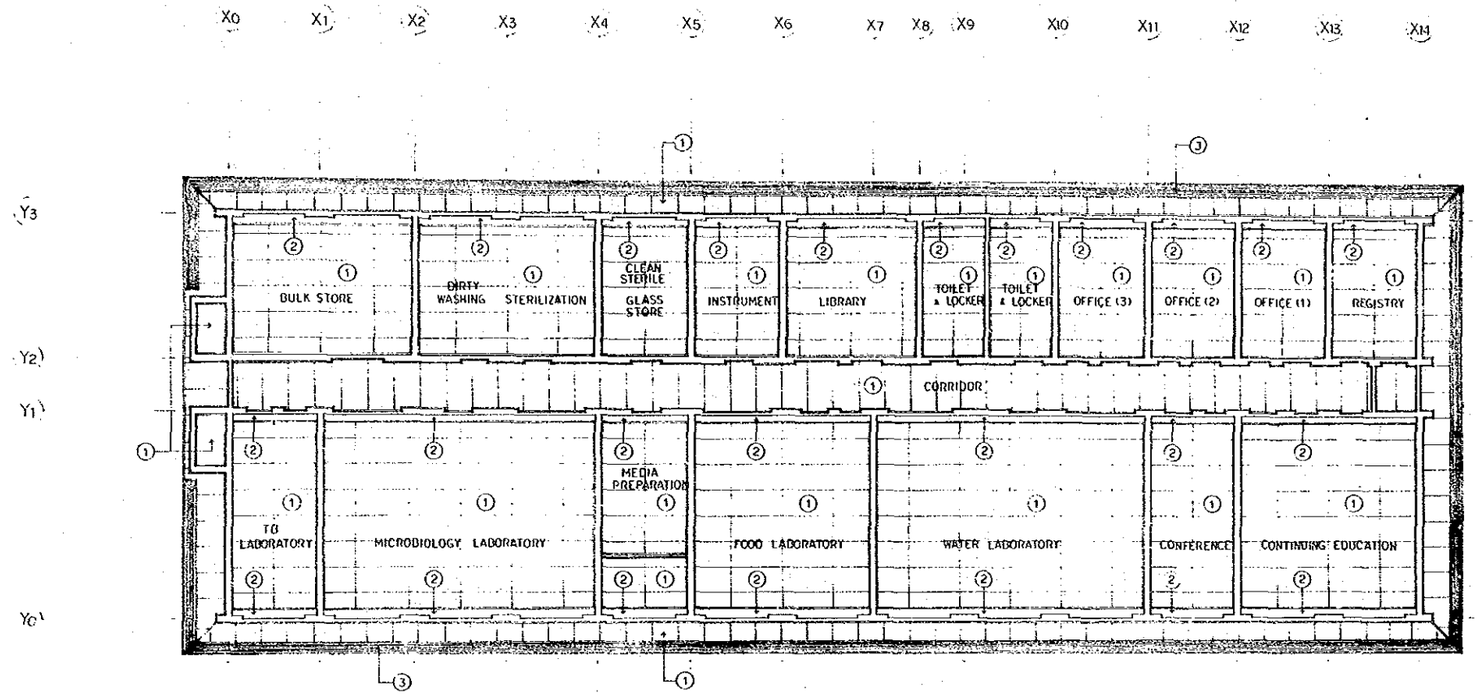
DETAIL-8 REGISTRY COUNTER S=1/5



DETAIL-9 CORRIDOR SIDE ALUMINUM LOUVER SASH S=1/5



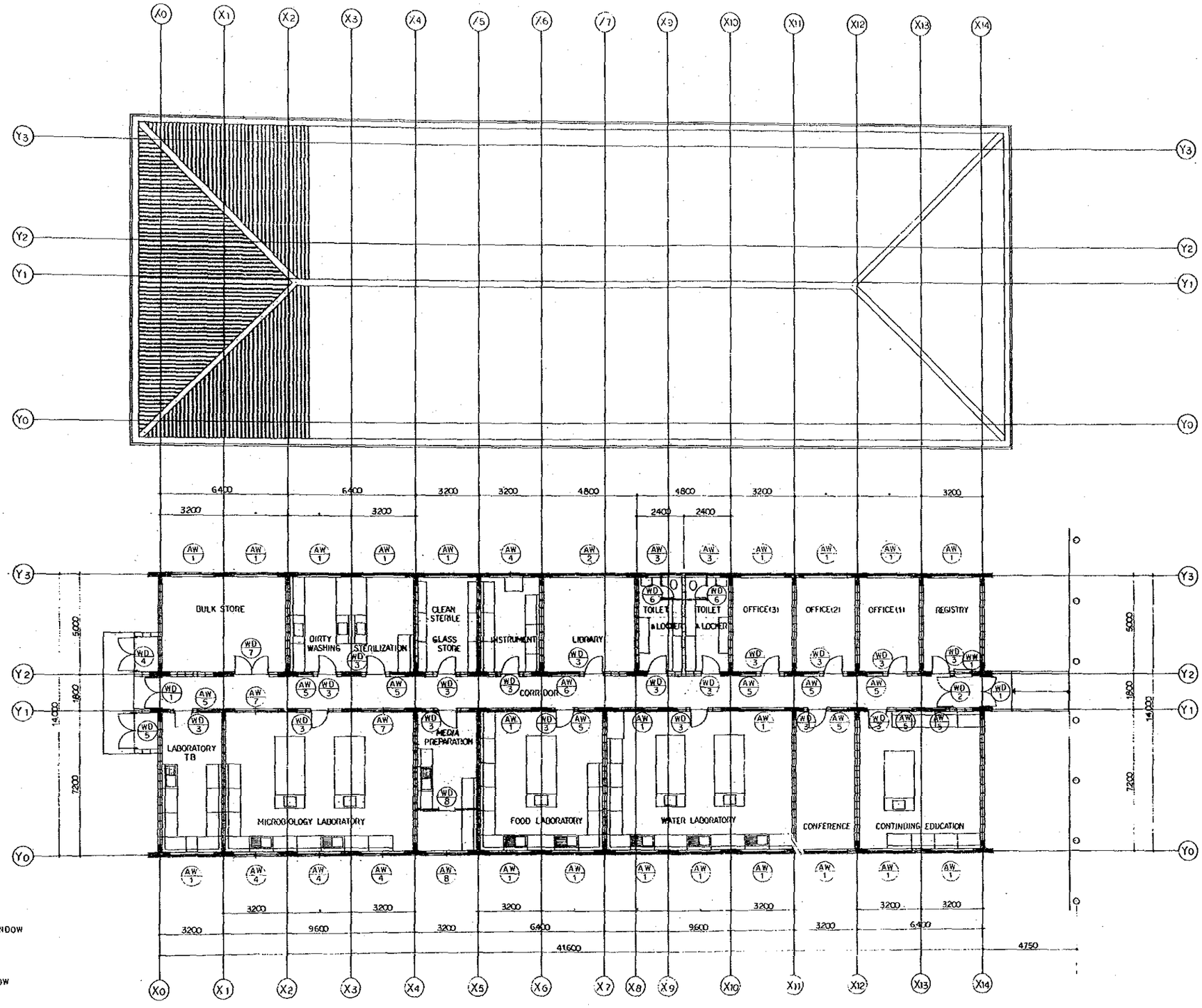
JAPAN INTERNATIONAL COOPERATION AGENCY		
JOB NO. MCF 82-16	TITLE OF THE PROJECT	Extension of The Health Laboratory of Vaiola Hospital, Tonga.
DRAWING NO. A-10	DRAWING NAME	INTERIOR ELEVATION & DETAILS SCALE 1/5 1/50
	DATE June '82 SENIOR ARCHITECT T. Saito	CHECKED DRAWN
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.		
6-6-12, KUDAN MINAMI, CHIYODA-KU, TOKYO, JAPAN TELEPHONE: TOKYO (03) 262-7161		



LEGEND	
①	HARDIFLEX 4.5 mm VP W/HARDIJOINTER
②	PLASTER TROWELLED
③	WOODEN BATTENS W 50 mm WIDE GAPS OP UNDER VERMINE PROOF COPPER WIRE MESH

CEILING PLAN S 1/100

JAPAN INTERNATIONAL COOPERATION AGENCY		
JOB NO. NCF 82-16	TITLE OF THE PROJECT: Extension of The Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO. A-11	DRAWING NAME: CEILING PLAN	SCALE 1/100
	DATE June '82 SENIOR ARCHITECT T.Suzuki CHECKED T.Kuwabara	DRAWN K.H
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.		



DOOR AND WINDOW KEY PLAN S=1/100

JAPAN INTERNATIONAL COOPERATION AGENCY			
JOB NO. HCF 82-16	TITLE OF THE PROJECT	Extension of The Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO. A-12	DRAWING NAME	DOOR & WINDOW SCHEDULE (1)	SCALE 1/100
	DATE June '82	SUPERVISED	CHECKED DRAWN

ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.
4-6-12, KUDAN-MINAMI, CHIYODA-KU, TOKYO, JAPAN TELEPHONE TOKYO (03) 262-7161

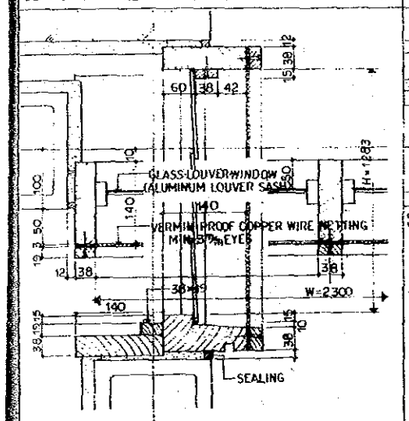
DOOR AND WINDOW SCHEDULE S=1/50

° 3 (THREE) COATS OF OIL PAINT SHALL BE APPLIED FOR ALL WOODEN DOORS AND WINDOWS ° ALL GLASS SHALL BE 5m/m THICK CLEAR SHEET GLASS

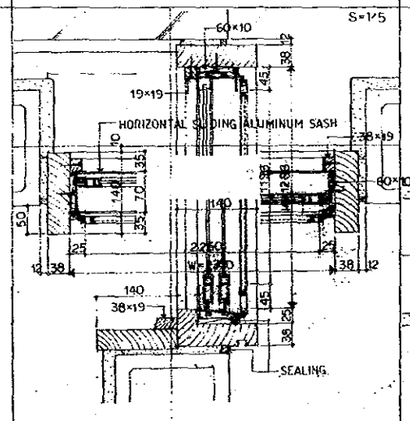
	AW 1	AW 2	AW 3	AW 4	AW 5	AW 6	AW 7	AW 8
MARK・QUANTITY	21	1	2	4	10	1	2	1
PLACE		LIBRARY	TOILET・LOCKER	MICROBIOLOGY LABORATORY MEDIA PREPARATION INSTRUMENT	CORRIDOR	LIBRARY	MICROBIOLOGY LABORATORY	MEDIA PREPARATION
FIGURE	ALUMINUM LOUVER SASH 9 BLADES ×3	DITTO 9 BLADES ×5	DITTO 9 BLADES ×2	HORIZONTAL SLIDING WINDOW W/FIXED VENTLIGHT FIXED GLASS HARDIFLEX6m/mVP	ALUMINUM LOUVER SASH 9 BLADES ×2	9 BLADES ×2	HORIZONTAL SLIDING WINDOW	HORIZONTAL SLIDING WINDOW
MEASURE(W・H)	CLEAR SHEET GLASS 5m/m 2250・1283	←DITTO 3850・1283	←DITTO 1650・1283	←DITTO 2250・1283	←DITTO 650・1283	←DITTO 1450・1283	←DITTO 2250・1283	←DITTO 2250・1283
HARDWARE								

	WD 1	WD 2	WD 3	WD 4	WD 5	WD 6	WD 7	WW 1	WD 8
MARK・QUANTITY	2	1	18	1	1	2	1	1	1
PLACE	CORRIDOR	CORRIDOR	CORRIDOR	GAS CYLINDER RM	ELECTRIC PANELBOARD RM	TOILET・LOCKER	BULK STORE	REGISTRY	
FIGURE	FIXED GLASS BROAD BUTT HINGE	FIXED GLASS	FIXED GLASS		FIXED GLASS LOUVER BOARDS		FIXED GLASS	FIXED GLASS	FIXED CLEAR SHEET GLASS 5m/m HARDIFLEX 6m/mVP FOR EACH SIDE
MEASURE (W・H)	CLEAR SHEET GLASS 5m/m 1500・2525	←DITTO 1500・2525	←DITTO 850・2525	1700・2725	1700・2725	600・1650	CLEAR SHEET GLASS 5m/m 1700・2525	←DITTO 850・1575	←DITTO 2900・2670
HARDWARE	BROAD BUTT HINGE 100m/m INTEGRAL ROCK	BROAD BUTT HINGE 100m/m INTEGRAL ROCK	BROAD BUTT HINGE 100m/m INTEGRAL ROCK	BROAD BUTT HINGE 100m/m INTEGRAL ROCK	BROAD BUTT HINGE 100m/m INTEGRAL ROCK	SPRING HINGE (SINGLE ACTING) RIM SLIDE BOLT W/INDICATOR	BROAD BUTT HINGE 100m/m INTEGRAL ROCK		FLOOR RAIL・STAINLESS STEEL BOTTOM ROLLER GEAR/W NYLON WHEEL FLUSH PULLS FOR SLIDING DOOR

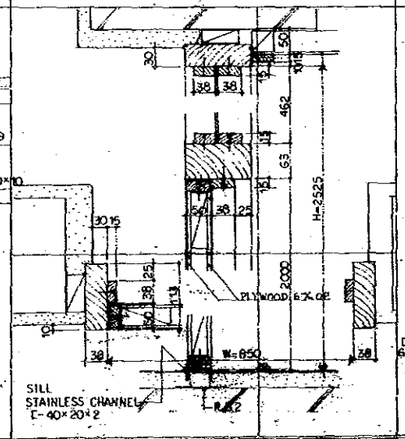
DETAIL-2 ALMINUM LOUVER WINDOW S=1/5



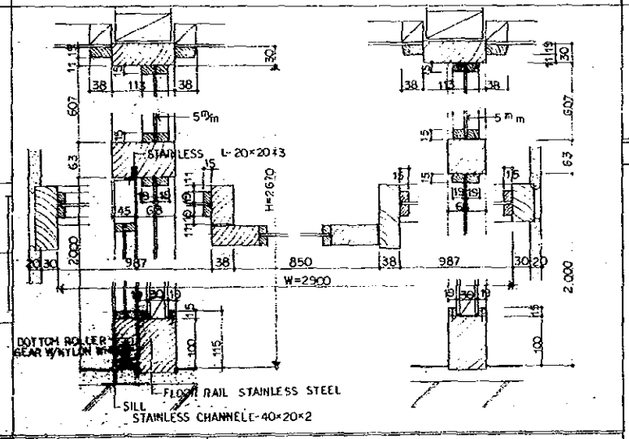
DETAIL-3 HORIZONTAL SLIDING ALMINUM WINDOW S=1/5



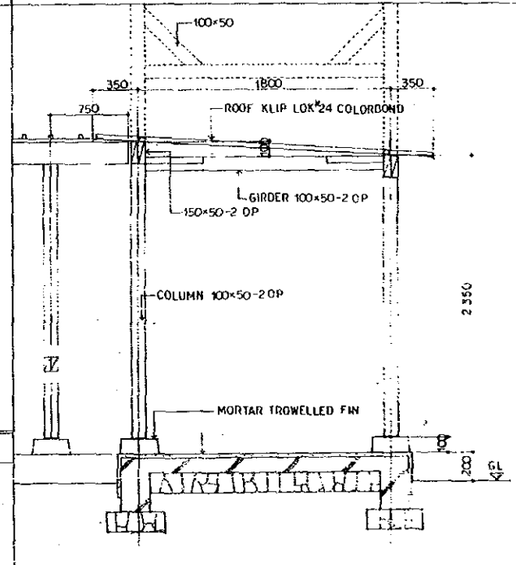
DETAIL-4 DOOR&VENTLIGHT S=1/5



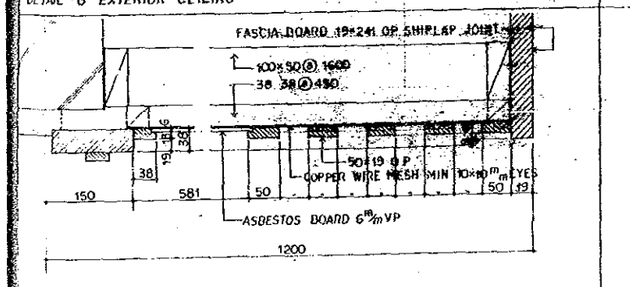
DETAIL-5 PARTITION (MEDIA PREPARATION) S=1/5



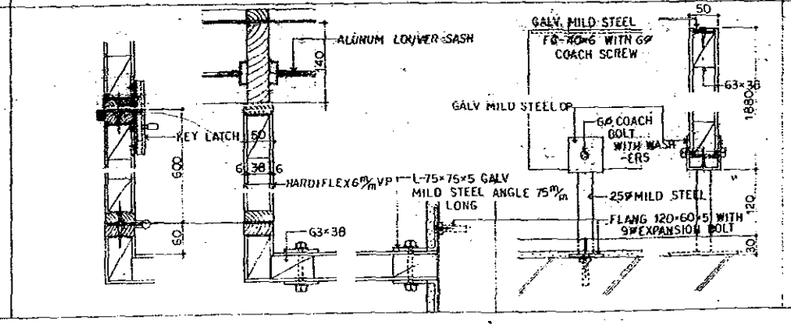
DETAIL-8 SLOP& OPEN CORRIDOR S=1/5



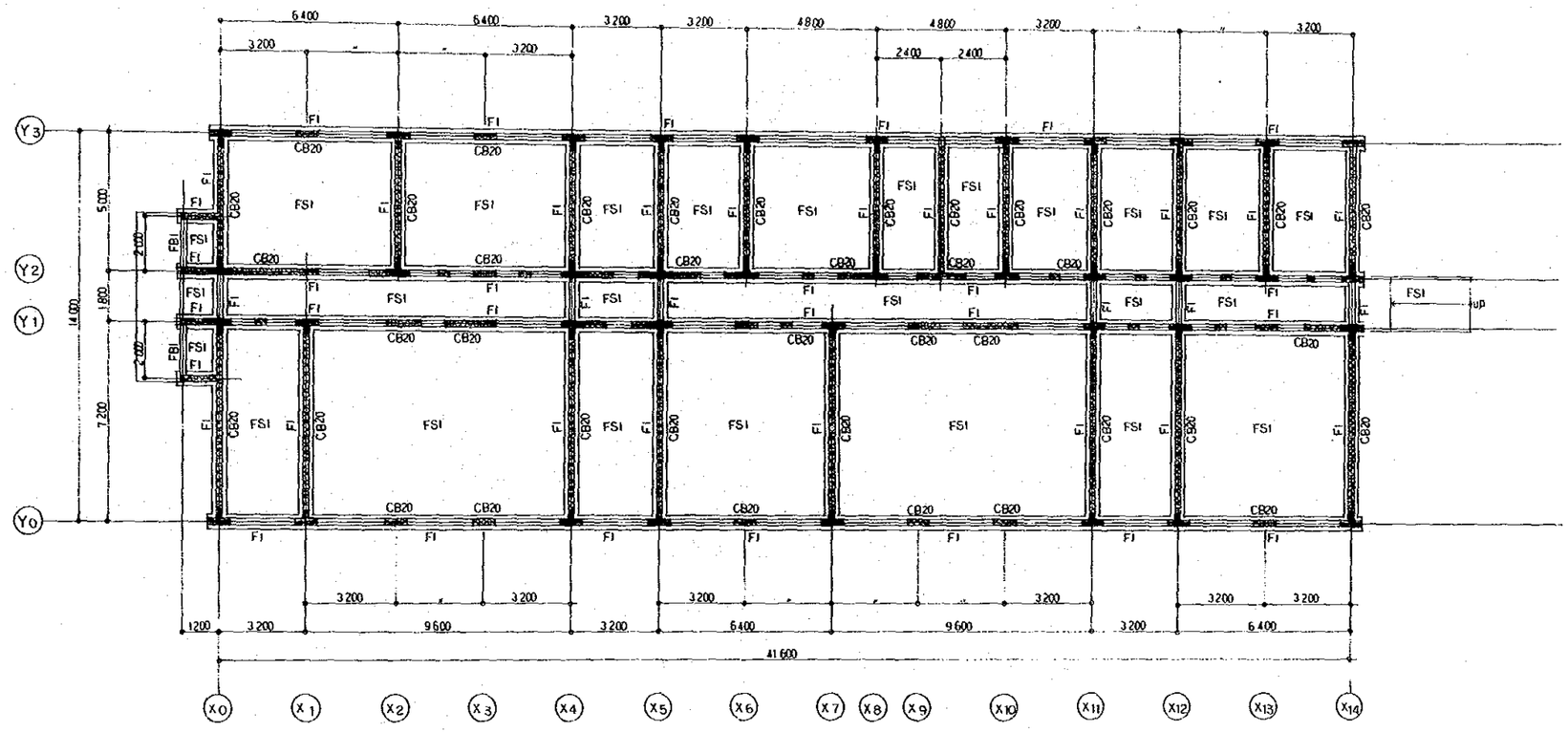
DETAIL-6 EXTERIOR CEILING S=1/5



DETAIL-7 PARTITION (TOILET&LOCKER) S=1/5

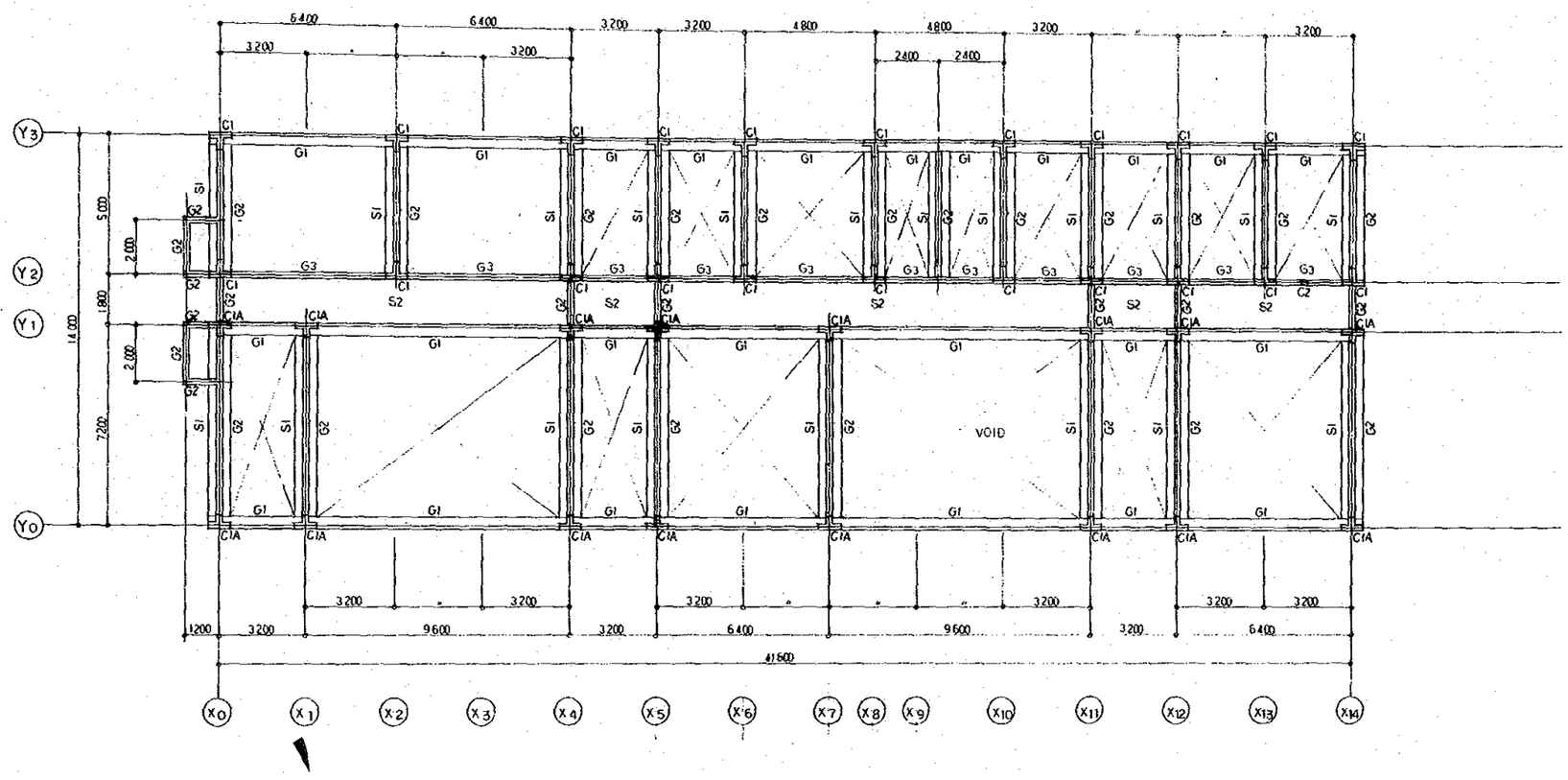


JAPAN INTERNATIONAL COOPERATION AGENCY		
JOB NO. MCF 82-16	TITLE OF THE PROJECT	Excavation of The Health Laboratory of Vaiola Hospital, Tonga.
DRAWING NO. A-13	DRAWING NAME	DOOR & WINDOW SCHEDULE. DETAILS SCALE 1/5 1/50
	DATE June '83	SENIOR ARCHITECT CHECKED DRAWN
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.		
4612 AOBA-MINAMI, CHIGASAKI, 'OKU, JAPAN TELEPHONE		



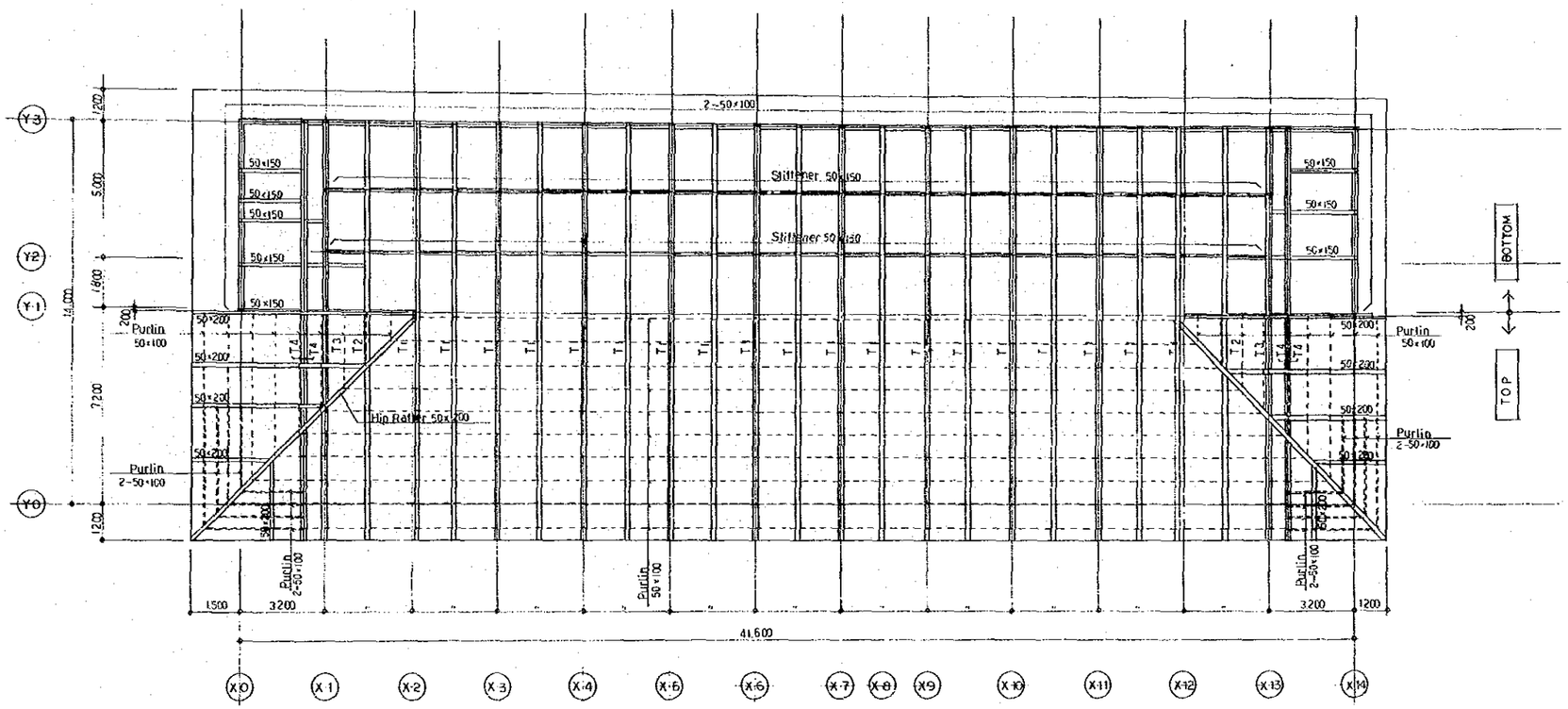
FOUNDATION PLAN 1/100

JAPAN INTERNATIONAL COOPERATION AGENCY			
JOB NO. MCF 82-16	TITLE OF THE PROJECT: Extension of The Health Laboratory of Vaiola Hospital, Tonga.		
DRAWING NO. S - 1	DRAWING NAME: FOUNDATION PLAN		SCALE 1/100
	DATE: June '83	SENIOR ARCHITECT: T. Suzuki	CHECKED: T. Kuwata
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.			
4-6-12, KUDAN-KITA, CHIYODA-KU, TOKYO, JAPAN TELEPHONE TOKYO (03) 262-7161			



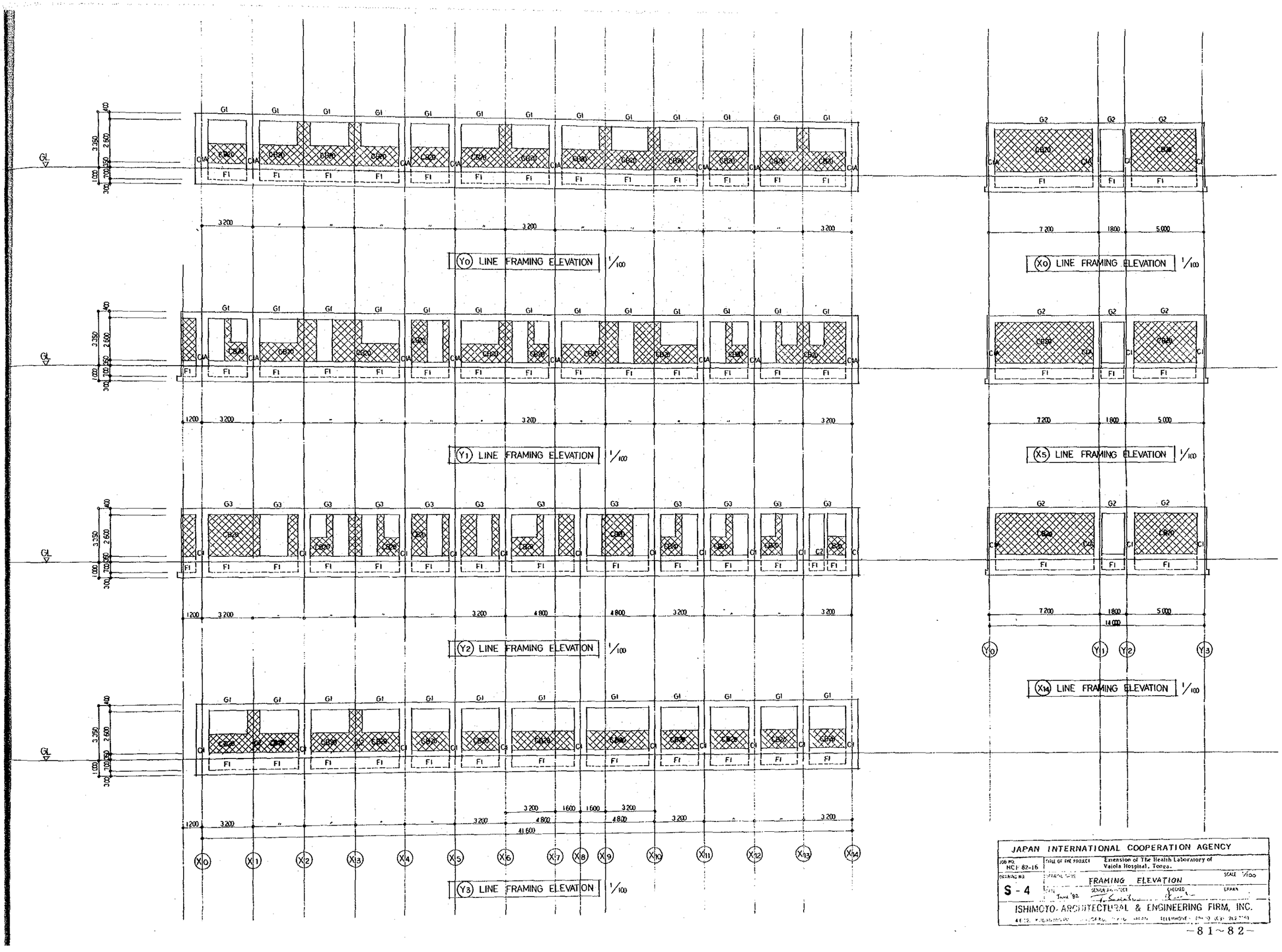
ROOF FLOOR BEAM PLAN 1/100

JAPAN INTERNATIONAL COOPERATION AGENCY			
JOB NO. MCF 82-16	TITLE OF THE PROJECT	Extension of The Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO. S-2	DRAWING NAME	ROOF FLOOR BEAM PLAN	SCALE 1/100
	DATE June '83	SENIOR ARCHITECT	DRAWN
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.			



TRUSS GIRDER PLAN 1/100

JAPAN INTERNATIONAL COOPERATION AGENCY		
JOB NO. 82-10	TITLE OF THE PROJECT: Extension of The Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO. S-3	ROOF FRAMING PLAN	SCALE 1/100
DATE June '83	CHECKED	DRAWN
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.		

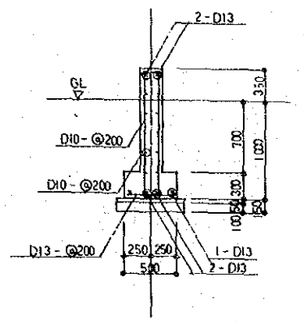
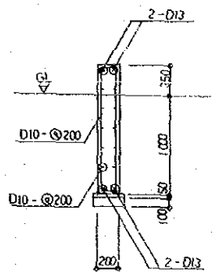


JAPAN INTERNATIONAL COOPERATION AGENCY

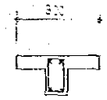
JOB NO. NCF 82-16	TITLE OF THE PROJECT	Extension of The Health Laboratory of Vaiola Hospital, Tonga.
DRAWING NO. S - 4	DRAWING NAME	FRAMING ELEVATION SCALE 1/100
	DATE June '82	DESIGNED CHECKED APPROVED

ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.

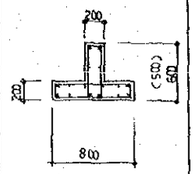
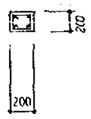
FOUNDATION LIST 1/30

SYMBOL	(F1)	(FB1)
SECTION		

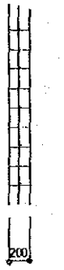
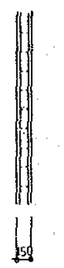
GIRDER & BEAM LIST 1/30

SYMBOL	(G1)	(G2)	(G3)
SECTION			
B x D	400 x 400	200 x 400	200 x 400
TOP BAR	3 - D16	2 - D13	2 - D16
BOTTOM BAR	3 - D16	2 - D13	2 - D16
STIRRUP BAR	D10 - @200	D10 - @200	D10 - @200

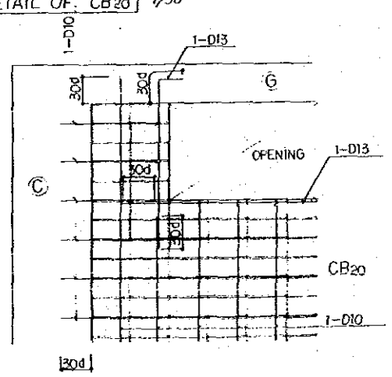
COLUMN LIST 1/30

SYMBOL	(C1) (C1)A	(C2)
SECTION		
Lx x Ly	1000 x 600	200 x 200
MAIN BAR	8 - D13 8 - D10	4 - D13
HOOP	D10 - @200	D10 - @200
DINGNAL HOOP		
NOTE	< > SHOWS C1A	

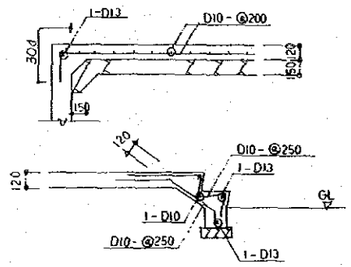
WALL LIST 1/30

SYMBOL	(CB20)	(W15)
SECTION		
VERTICAL BAR	D10 - @400	D10 - @200
HORIZONTAL BAR	D10 - @400	D10 - @200
NOTE		

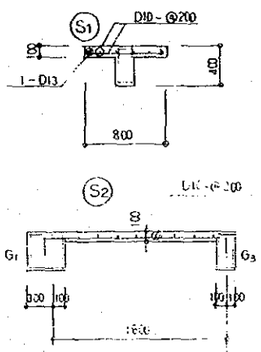
DETAIL OF CB20 1/30

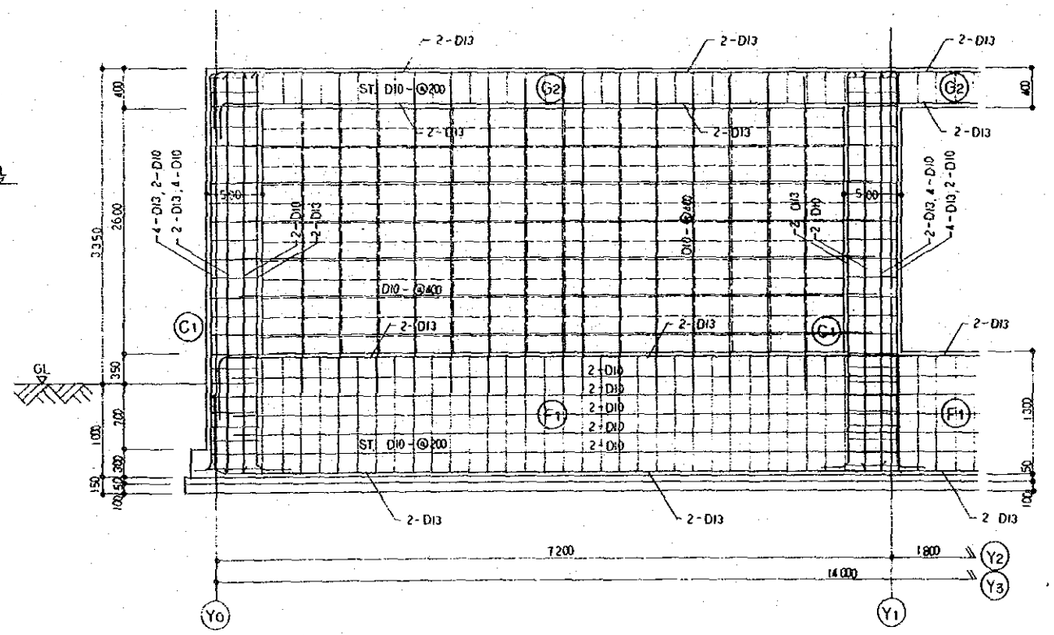


DETAIL OF FS1 1/30



DETAIL OF SLAB 1/30





(X11) LINE FRAMING DETAIL 1/30

JAPAN INTERNATIONAL COOPERATION AGENCY		
JOB NO. M.C.F. 82-16	TITLE OF THE PROJECT	Extension of The Health Laboratory of Vaiola Hospital, Tonga.
DRAWING NO. S - 5	DRAWING TITLE	FOUNDATION, GIRDER, BEAM, COLUMN & DETAILS (SCALE 1/30)
	DATE June '82	STRUCTURAL ARCHITECT CHECKED DRAWN
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.		

TECHNICAL SPECIFICATION OF ELECTRICAL WORKS.

1 NAME OF PROJECT — EXTENSION OF THE HEALTH LABOLATORY OF VAIOLA HOSPITAL

2 BLDG. OUTLINE. — SITE. AREA

BLDG. AREA 595.M²750

TOTAL FLOOR AREA 595.M²750

3 RANGE OF WORK AND STANDARDS OF INSTALLATIONS.

ITEMS NOT NOTED IN THIS TECHNICAL SPECIFICATION AND ELEC. DWGS SHALL BE BASED ON THE HANDBOOK TO THE ELECTRICAL WIRING REGULATIONS 1976 (PREPARED BY ELECTRICITY DIVISION MINISTRY OF ENERGY) AND OTHER RELATED RULES IN TONGA.

4 FLASH PLATES

ASSORTMENT : SQUARE SHAPED METAL PLATES.

NOTE : THE PLATES OF JUNCTION BOXES SHALL BE USED CIRCULAR ONE.

5 LEADING-IN WIRE

CONDUITS (RESERVE CONDUITS) WHICH DO NOT CARRY ELECTRICAL WIRES SHALL CARRY A VINYL COVERED STEEL WIRE OF AT LEAST 1.2 mm. IN DIAMETER.

THE BOTH ENDS OF THESE STEEL WIRES SHALL BE ATTACHED INFORMATION INDICATING THE ROUTE.

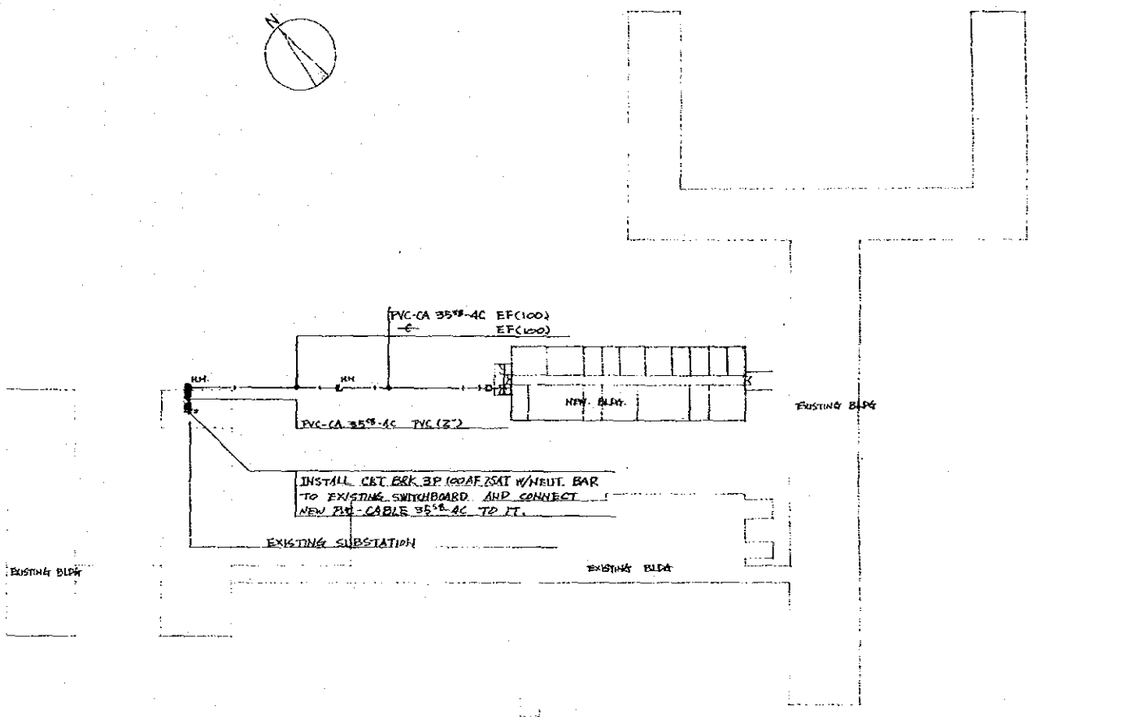
6 MOUNTING HEIGHT FOR EQUIPMENT.

MOUNTING HEIGHT FOR EQUIPMENT SHALL BE BASED ON THE FOLLOWING LIST, HOWEVER THEY MAY BE ALTERED AT THE DIRECTION OF THE SUPERVISOR.

EQUIP.	MEASURED FORM - TO HEIGHT	
DISTRIBUTION BOARD	FLOOR-UPPER EDGE	1800
LTG. SWITCHES	FLOOR-CENTER	1300
RECEPTACLES (ORDINARY)	DO.	300
DO. (STAGE)	ON STAGE -CENTER	150
WALL LIGHTS (ABOVE MIRRORS)	MIRROR EDGE -CENTER	150
TEL. OUTLET	FLOOR-CENTER	300
FIRE ALARM CONT. PANEL	FLOOR-UPPER EDGE	1800
FIRE ALARM BELL	FLOOR-CENTER	2100
MANUAL STATION	DO.	1300

7 ITEMS OF ELECTRICAL WORKS

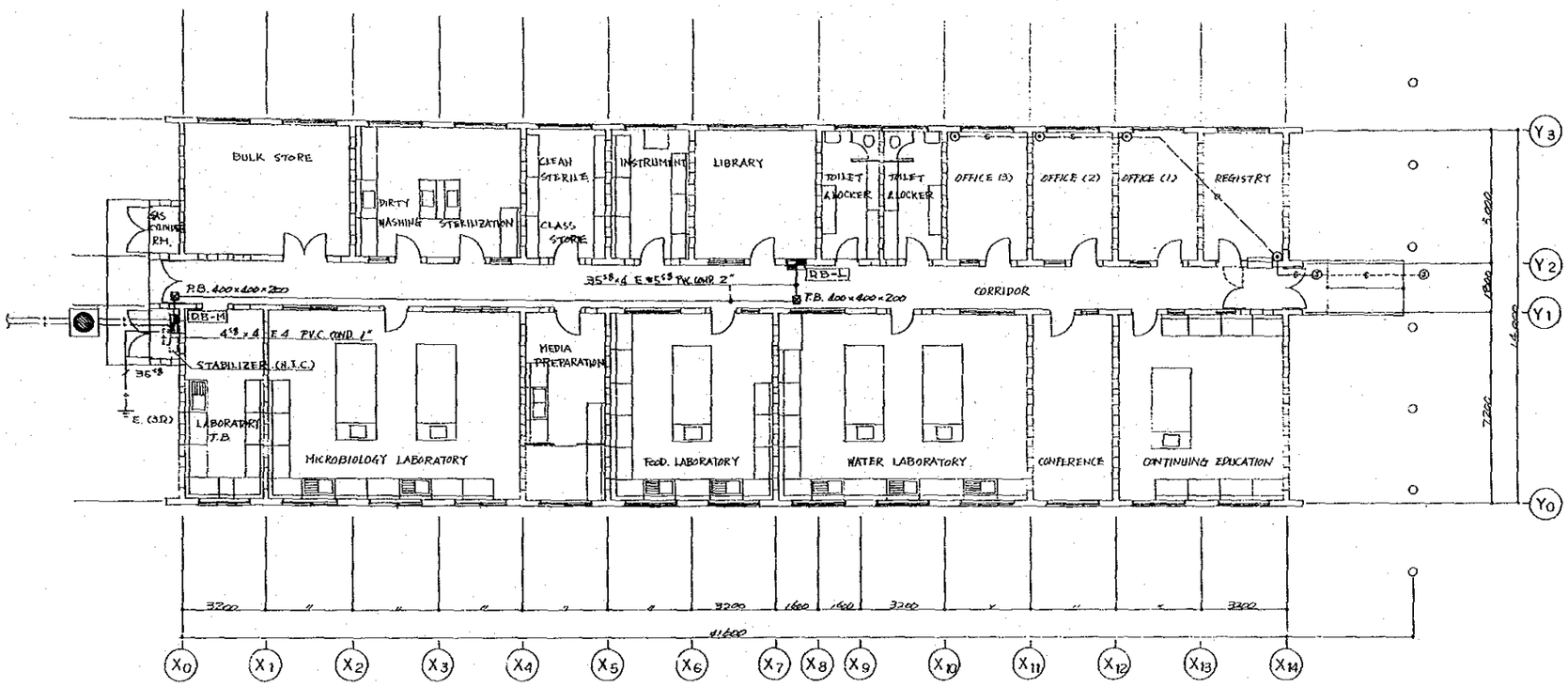
1 REPAIR OF EXISTING SUBSTATION
2 FEEDER INSTALLATION
3 LIGHTING AND RECEPTACLE EQUIPMENT
4 LIGHTING FITTING EQUIPMENT
5 TELEPHONE PIPING INSTALLATION
6 FIRE ALARM EQUIPMENT



NOTE.
- H.H. HAND HOLE 1000×1000×1400 W/60ᵗʰ CAST IRON COVER
- PULL BOX 400×400×200
- UNDERGROUND LINE 61-1200
- EF PVC FLEXIBLE CONDUIT TYPE

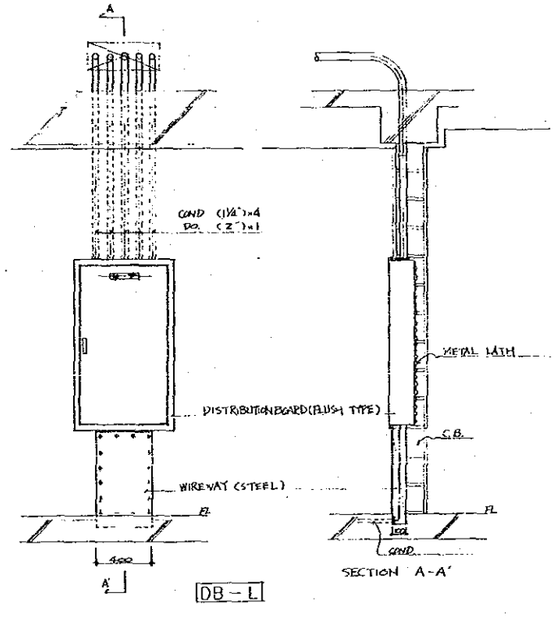
PLOT PLAN S=1/600

JAPAN INTERNATIONAL COOPERATION AGENCY			
JOB NO. MCF 82-16	TITLE OF THE PROJECT	Extension of The Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO. E-1	DRAWING NAME	PLOT PLAN	SCALE 1/600
	DATE June '83	SENIOR ARCHITECT	CHECKED DRAWN JIB
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.			
	TELEPHONE: TOKYO (03) 269-7161		

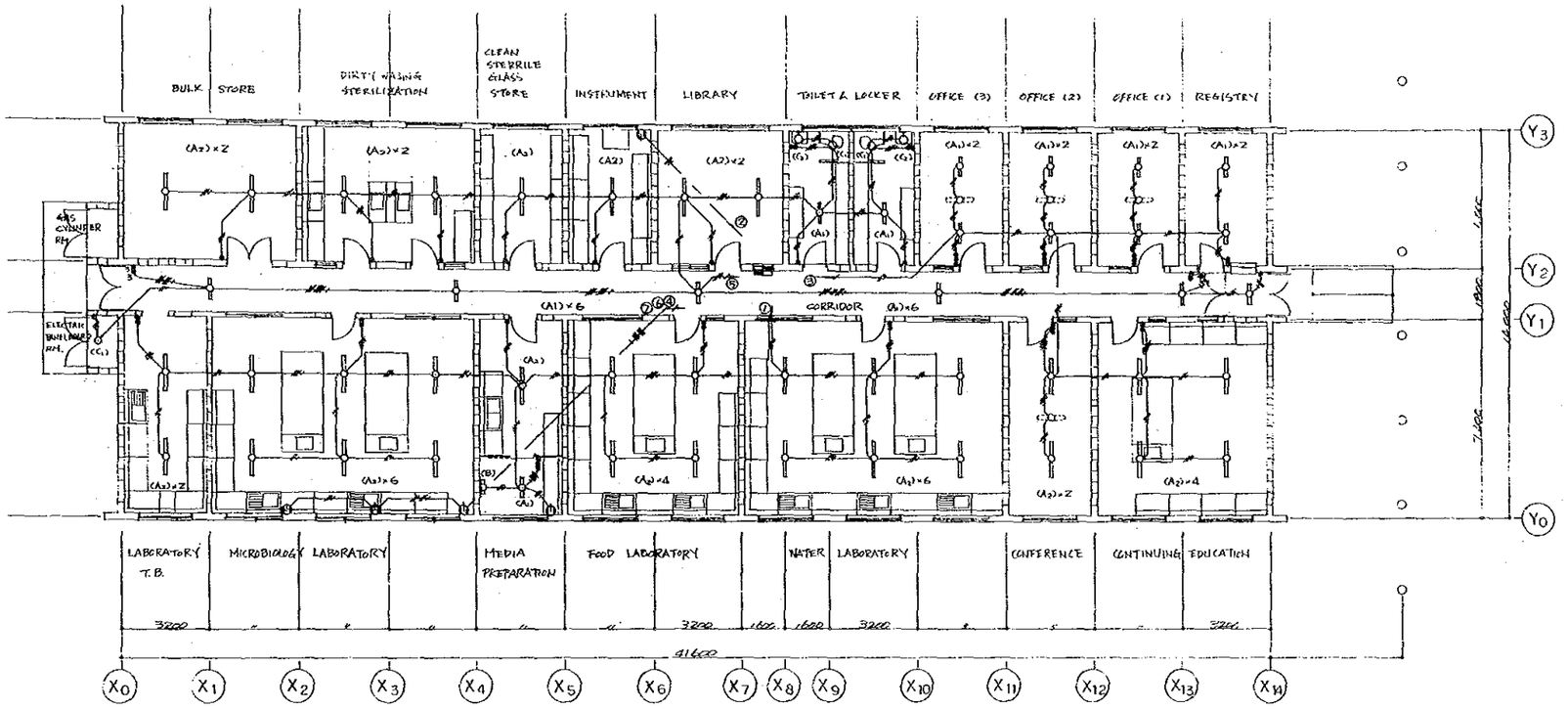


LEGEND

- FEEDER
- DISTRIBUTION BOARD
- P.B. PULL BOX
- H.H. HAND HOLE 1000×1000×1400 H/ €00ø CAST IRON COVER
- E (3Ω) EARTHING (LESS THAN 3Ω)
- TELEPHONE PIPING
- BOX FOR TELEPHONE W/TELEPHONE PLATE
- JUNCTION BOX
- PVC COND. (1")



JAPAN INTERNATIONAL COOPERATION AGENCY		
JOB NO. PCF 82-16	TITLE OF THE PROJECT: Extension of The Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO. E-2	DRAWING TITLE: FEEDER INSTALLATION PLAN	SCALE 1/100
DATE June '83	SENIOR ARCHITECT	CHECKED / DRAWN
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.		



LEGEND

	FLUORESCENT FITTING (CEILING TYPE)
	DITTO (WALL TYPE)
O	INCANDESCENT FITTING (CEILING TYPE)
HO	INCANDESCENT FITTING (WALL TYPE)
•	SNAP SWITCH (FLUSH TYPE) RATING 1P 10A 300V
•3	DITTO RATING 3-WAY 10A 300V
	RECEPTACLE (FLUSH TYPE) RATING 10A 3-PIN FLAT PIN TYPE
	DISTRIBUTION BOARD (FLUSH TYPE)
	OUTLET TO FIXED FAN
	SUBCIRCUIT NUMBER

NOTE

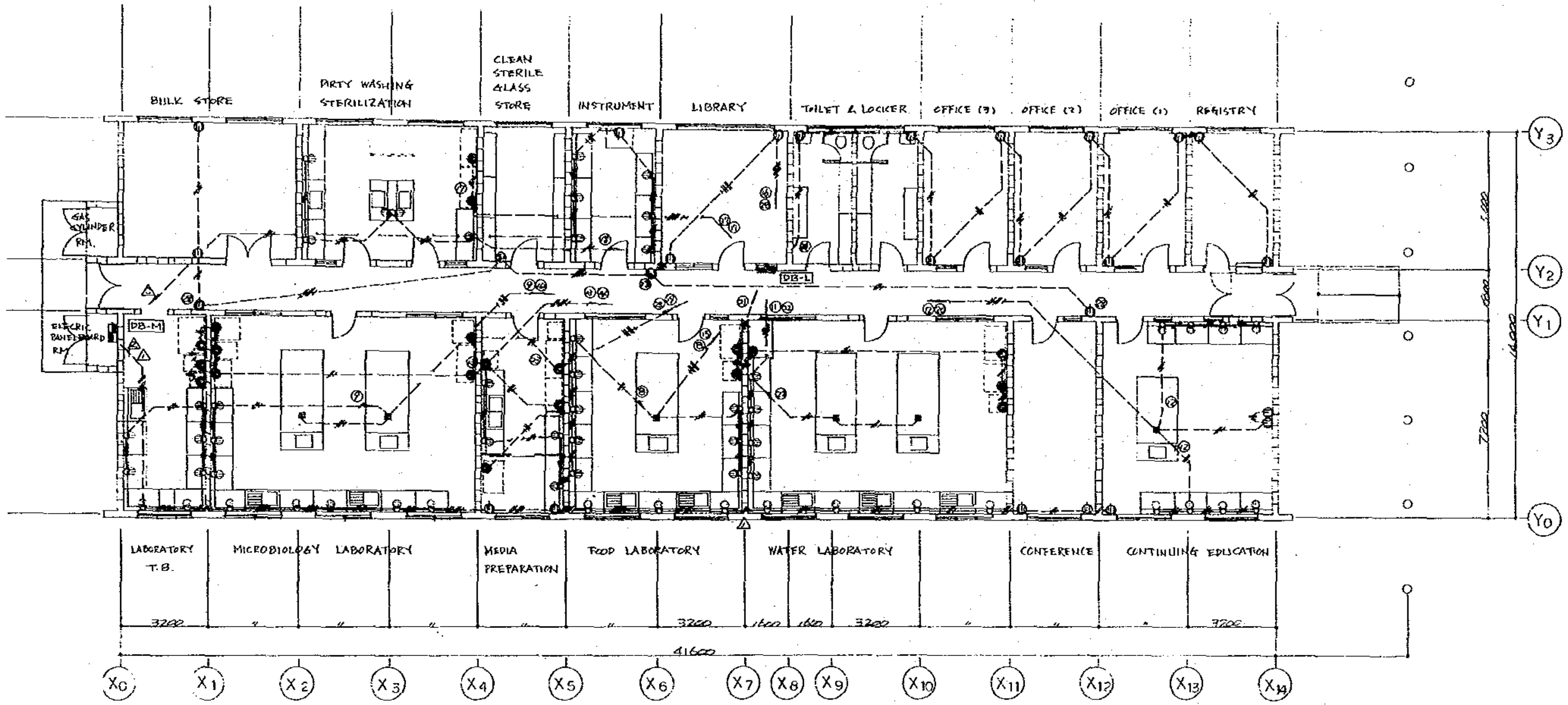
PIPING AND WIRING ARE AS FOLLOWS

4mm × 2	E 4mm PVC (5/8")
4mm × 3	E 4mm PVC (1")
4mm × 4	E 4mm PVC (1")
4mm × 5	E 4mm PVC (1")
4mm × 6	E 4mm PVC (1")
4mm × 7	E 4mm PVC (1")

JAPAN INTERNATIONAL COOPERATION AGENCY

PROJ. NO. NUE 82-10	Extension of The Health Laboratory of Vaiola Hospital, Tonga.
E-3	LIGHTING & RECEPTACLE EQUIPMENT PLAN
DATE June '82	DRAWN / CHECKED / APPD.

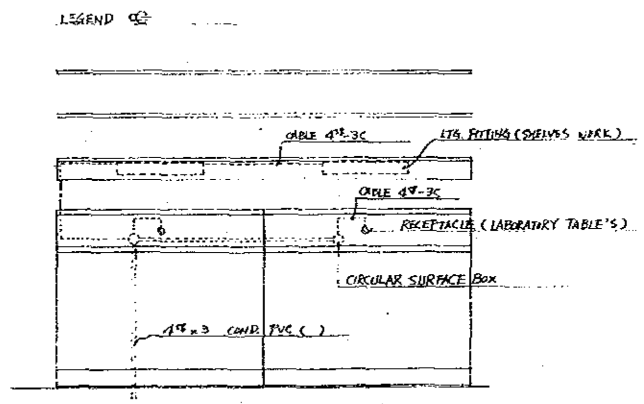
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.



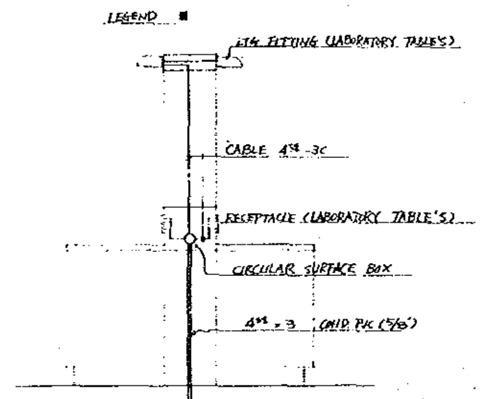
LEGEND

⊖	RECEPTACLE (FLUSH TYPE)
⊖	RECEPTACLE (EXPOSED TYPE)
	OUTLET BOX FOR BENCH'ES RECP & LTG FITTING (CONNECT THE PVC CABLES WITH BENCH'ES RECP. & LTG FITTING)
▪	OUTLET BOX FOR CENTER BENCH (CONNECT THE PVC CABLES WITH BENCH'ES RECP. & LTG FITTING)
	DISTRIBUTION BOARD

NOTE	PIPING AND WIRING ARE AS FOLLOWS
—//—	4㎟ × 2 E 4㎟ PVC (5/8")
—////—	4㎟ × 4 E 4㎟ PVC (1")



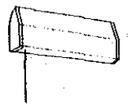
LABORATORY TABLE



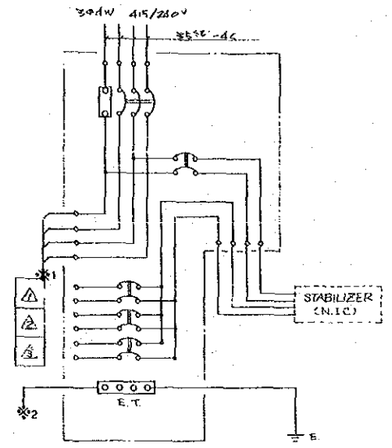
LABORATORY TABLE (CENTER TYPE)

JAPAN INTERNATIONAL COOPERATION AGENCY				
JOB NO. HCF 82-16	TITLE OF THE PROJECT: Extension of The Health Laboratory of Vaiola Hospital, Tonga.			
DRAWING NO. E - 4	DRAWING NAME: RECEPTACLE EQUIPMENT			SCALE 1/100
	DATE June '82	SENIOR ARCHITECT	CHECKED	DRAWN
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.				

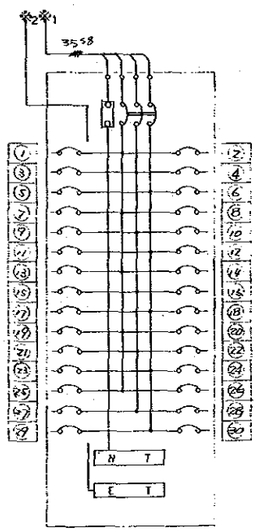
A	CEILING TYPE FLUORESCENT FITTING	B	ULTRAVIOLET LAMP FITTING
A_1	FL 20W x 1	B	UL 15W x 1
A_2	FL 40W x 1		



C	INCANDESCENT FITTING
C_1	IL 40W (CEILING TYPE)
C_2	IL 40W (WALL TYPE)



DB-M (EXPOSED TYPE)



DB-L (FLUSH TYPE)

DISTRIBUTIONBOARD LOARD'S TABLE

DISTRIBUTION METHOD: PRIMARY 3-PHASE 4-WIRES 415V-240V; SECONDARY 1-PHASE 2-WIRES 240V

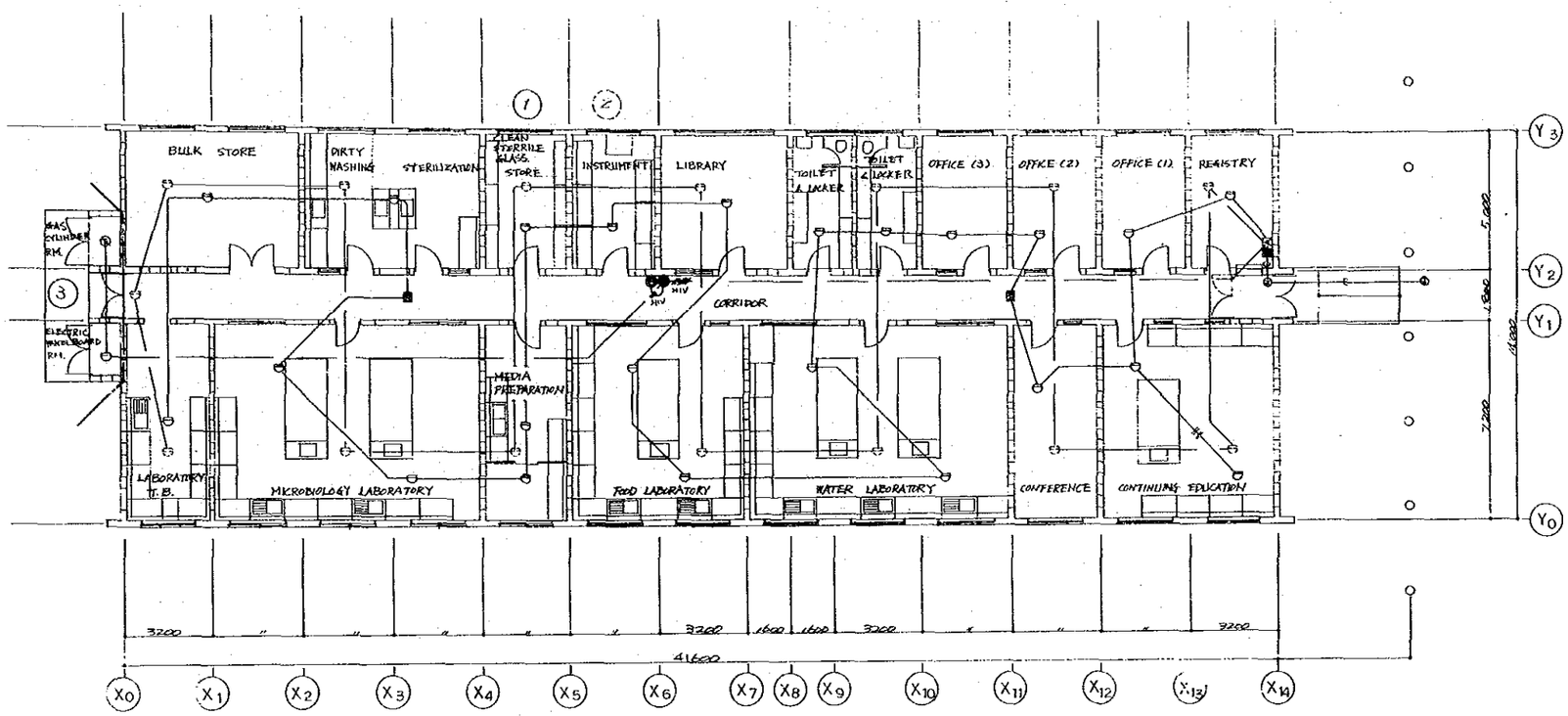
DISTRIBUTINBOARD	C.K.T. No.	LOARD DESIGNATION	LOARD CAP. VA a PH.	b PH.	c PH.
	1	LTG.	1,320		
	2	RECP.	1,500		
	3	LTG.		1,080	
	4	RECP.		1,500	
	5	LTG.			1,080
	6	RECP.			1,500
	7	DO	1,500		
	8	DO	1,920		
	9	DO		1,600	
	10	DO		800	
	11	DO			800
	12	DO			1,600
	13	DO	2,950		
	14	DO	2,400		
	15	DO		1,000	
	16	DO		250	
	17	DO			5,000
	18	DO			1,000
	19	DO	5,200		
	20	DO	800		
	21	DO		2370	
	22	DO		800	
	23	DO			3,000
	24	DO			1,500
	25			0	
	26			0	
	27	RECP.		5200	
	28	DO		600	
	29			0	
	30			0	
	TOTAL		17,570	15,700	15,480
				2,000	STABILIZER
	GRAND TOTAL		17,570	17,700	15,480

CIRCUIT BREAKER 3P 100AF 75AT W/NEUT BAR 100A

CIRCUIT BREAKER 2P 50AF 20AT

CIRCUIT BREAKER 1P 50AF 20AT

JAPAN INTERNATIONAL COOPERATION AGENCY		
JOB NO. MCF 82-16	TITLE OF THE PROJECT: Extension of The Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO. E-5	DRAWING NAME: LIGHTING FITTING & DISTRIBUTIONBOARD DIAGRAM	SCALE:
	DATE: June '82	DESIGNED: DRAWN: CHECKED:
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.		



LEGEND

⊖	HEAT DETECTOR	SECOND CLASS (3 ; ATTIC
⊛	DO.	ANTI-EXPLOSION TYPE
▣	SMOKE DETECTOR	SECOND CLASS
ⓜ	MANUAL STATION	
●	ALARM BELL	
FA	FIRE ALARM CONTROL PANEL W/ 3-INDICATOR, MAIN BELL	
ⓙ	JUNCTION BOX	
㉑ ㉒	FIRE ALARM ZONE No.	
———	ZONE BOUNDARY	

NOTE

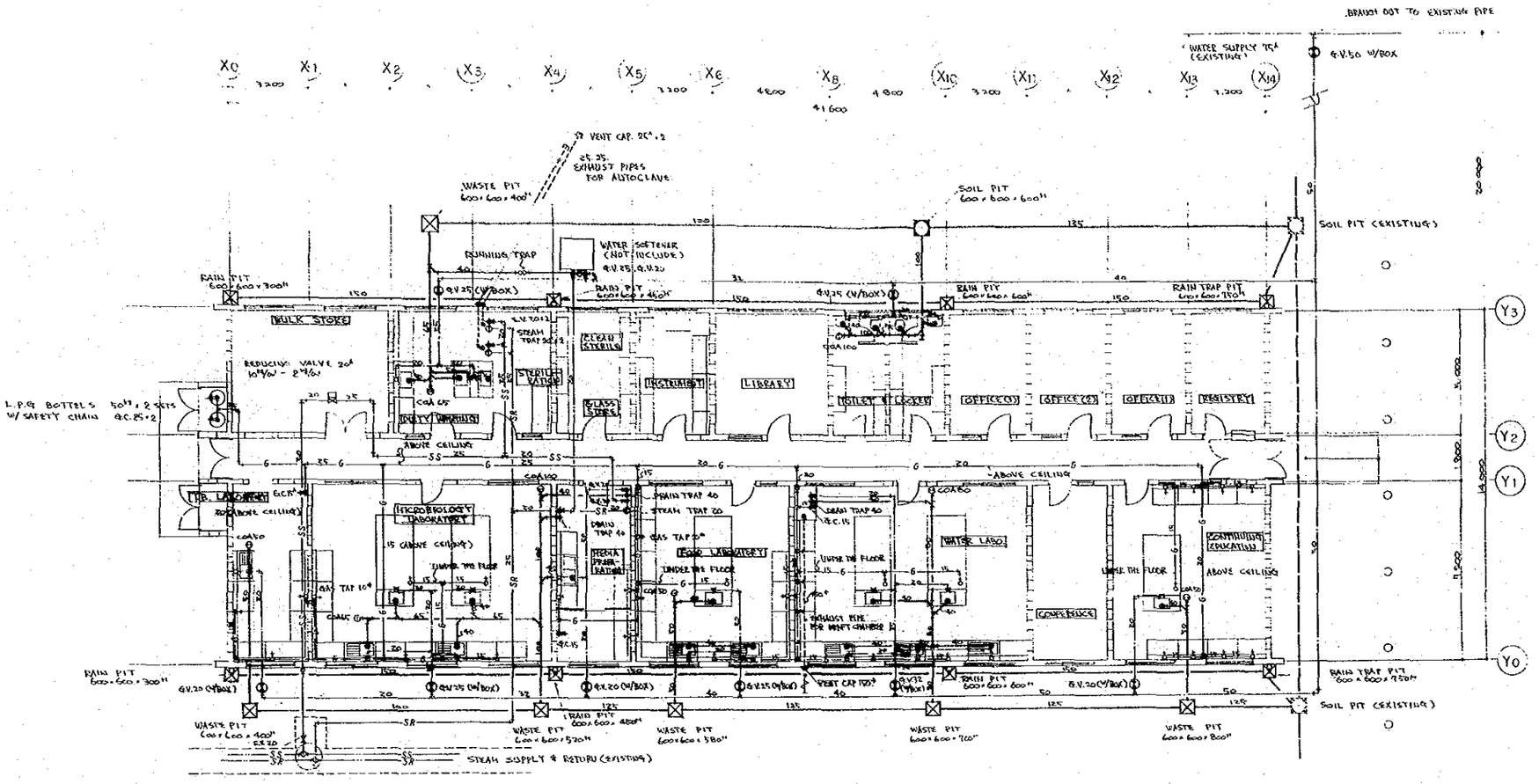
PIPING AND WIRING ARE AS FOLLOWS

——— 1.5^{SB} × 2 PVC (5/8")

—//— 1.5^{SB} × 4 PVC (5/8")

WIRE "HIV" MEAN HEAT-PROTECTIVE WIRE.

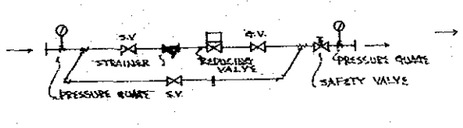
JAPAN INTERNATIONAL COOPERATION AGENCY		
JOB NO. MCF 82-16	TITLE OF THE PROJECT	Extension of The Health Laboratory of Vaiola Hospital, Tonga.
DRAWING NO. E-6	DRAWING NAME	FIRE ALARM EQUIPMENT PLAN SCALE 1/100
	DATE June '82	SEARCH BY [illegible] CHECKED [illegible] PAPER A1
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.		
[illegible] JAPAN TELEPHONE: TOKYO (03) 262 [illegible]		



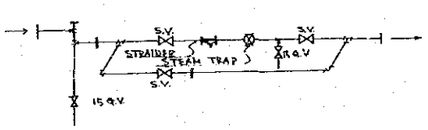
SPECIFICATION

1	JOB NAME	
2	LOCATION	
3	ITEM OF CONSTRUCTION	1. SANITARY FIXTURES 2. WATER SUPPLY (INCLUDE SOFT WATER SUPPLY) 3. DRAINAGE (INCLUDE EXHAUST PIPES) 4. L.P.G. SUPPLY 5. STEAM SUPPLY
4	SPECIFICATION	a. INSULATION : INDOOR EXPOSED ..... GLASS WOOL + COTTON CLOTH + PAINTING OUTDOOR EXPOSED ..... GLASS WOOL + ASPHALT ROOFING + GALVANIZED STEEL PLATE + PAINTING UNDER THE FLOOR ..... GLASS WOOL + ASPHALT ROOFING + ANTICORROSIVE TAPE THIS SPECIFICATION IS APPLIED ONLY TO STEAM SUPPLY PIPES. OTHER PIPES ARE NOT INSULATED. b. PIPING UNDER THE FLOOR (GAS PIPES & STEAM RETURN PIPES) ANTICORROSIVE TAPES ARE USED. c. PIT FOR DRAINAGE ARE MADE BY CONCRETE BLOCKS. (W/ MANHOLE COVER) d. FITTINGS ARE NOT INCLUDED IN THIS CROSS SECTION BUT PIPE JOINT SOCKETS ARE INCLUDED. e. EXHAUST PIPES MATERIAL ..... FOR DRAFT CHAMBER ..... P.V.C PIPES FOR AUTOCLAVE ..... GALVANIZED STEEL PIPES

REDUCING VALVE ARRANGEMENT



STEAM TRAP ARRANGEMENT



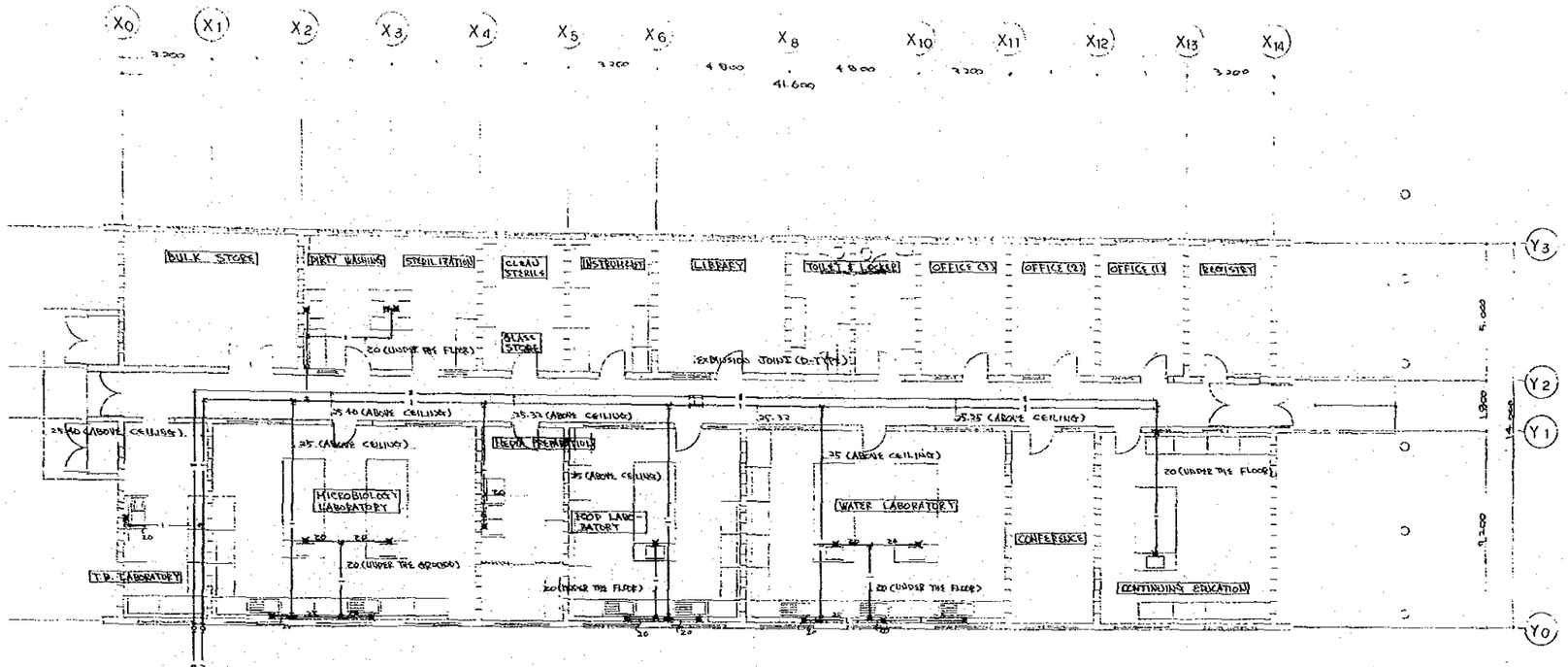
EQUIPMENT LIST

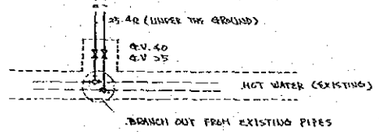
ROOM NAME	EQUIPMENT NAME	QTY	REMARKS
DIRTY WASHING STERILIZATION	STOP VALVE 20A	2	
	STEAM TRAP 20A	2	
	CLEAN OUT 65A	1	
TOILET & LOCKER	WATER CLOSET	2	LOW CISTERN
	WASH BASIN	2	
	TOILET MIRROR	2	
	CLEAN OUT 100A	1	
T.B. LABORATORY	CLEAN OUT 50A	1	
	GAS COCK 15A	1	
MICROBIOLOGY LABO.	CLEAN OUT 65A	1	
	" 100A	1	
MEDIA PREPARATION	GAS COCK 15A	1	
	GATE VALVE 20A	2	
	STOP VALVE 20A	1	
	STEAM TRAP 20A	1	
	DRAIN TRAP 40A	2	
FOOD LABORATORY	CLEAN OUT 50A	1	
WATER LABORATORY	GAS COCK 15A	1	
	GATE VALVE 20A	1	
	DRAIN TRAP 40A	1	
	CLEAN OUT 30A	1	
	VENT CAP 150A	1	
CONTINUING EDUCATION	CLEAN OUT 50A	1	

LEGEND

SYMBOL	NAME	MATERIALS
	WATER SUPPLY	PVC PIPES
	SOFT WATER	DITTO
G	L.P.G.	GALVANIZED STEEL PIPES
	WASTE WATER	PVC PIPES
SS	STEAM SUPPLY	GALVANIZED STEEL PIPES
SR	STEAM RETURN	DITTO
	CLEAN OUT	
T	STEAM TRAP	
	GAS TAP	
	BIB TAP	
G.V.	GATE VALVE	
G.C.	GAS COCK	

JAPAN INTERNATIONAL COOPERATION AGENCY			
JOB NO. MCF 82-16	TITLE OF THE PROJECT	Extension of The Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO. M-1	DRAWING NAME	PLUMBING PLAN & EQUIPMENT LIST	SCALE 1/100
	DATE June '83	SENIOR ARCHITECT I. Castle	CHECKED Tkano DRAWN EC
ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.			





SPECIFICATION

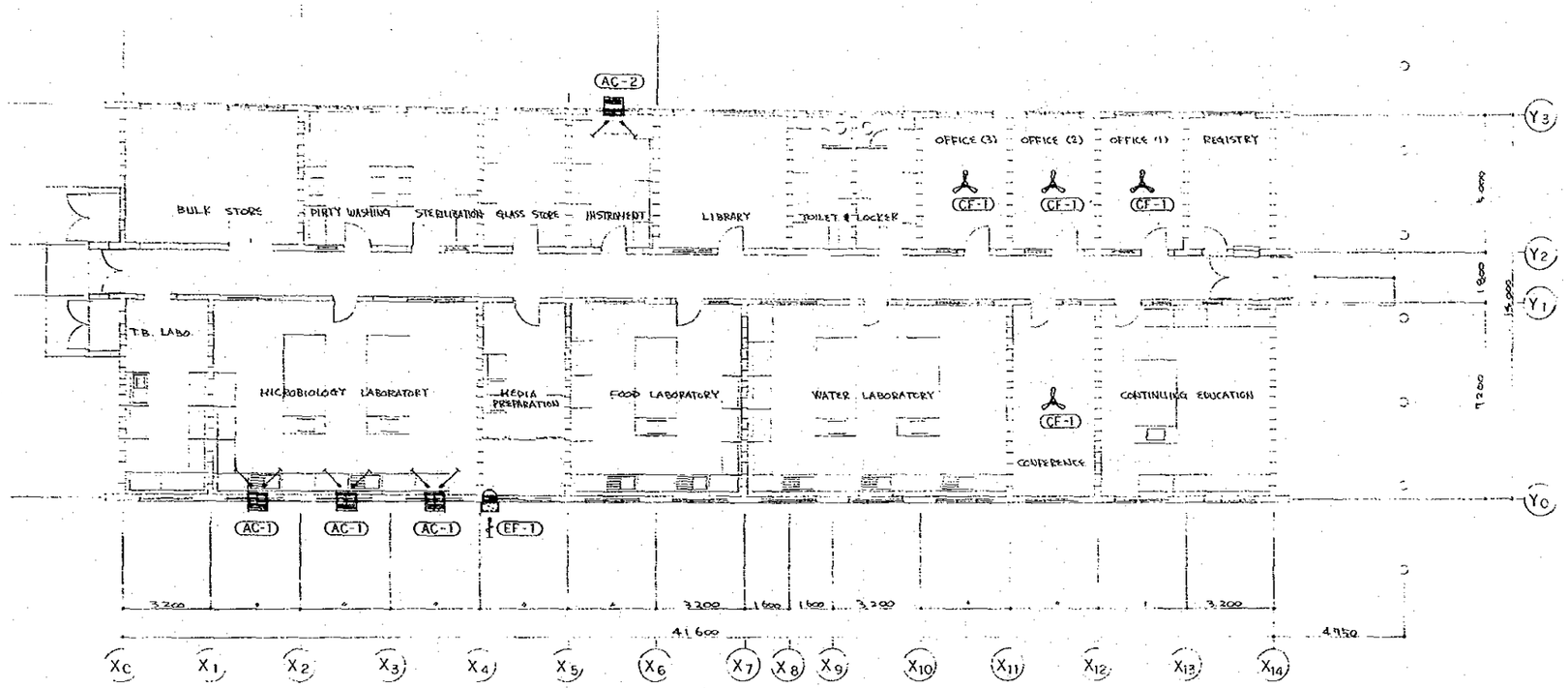
1 MATERIAL : PIPE ---- COPPER PIPE , VALVE ---- GATE VALVE

2 INSULATION : INDOOR EXPOSED ---- GLASS WOOL + COTTON CLOTH + PAINTING
OUTDOOR EXPOSED ---- GLASS WOOL + ASPHALT ROOFING + GALVANIZED STEEL PLATE + PAINTING
UNDER THE FLOOR ---- GLASS WOOL + ASPHALT ROOFING + ANTICORROSIVE TAPE
UNDER THE GROUND ---- DITTO

3 FITTINGS (FLANGES) ARE NOT INCLUDED IN THIS WORKS, BUT PIPE JOINTS ARE INCLUDED.

JAPAN INTERNATIONAL COOPERATION AGENCY			
JOB NO. MCY 82-16	TITLE OF THE PROJECT: Extension of The Health Laboratory of Vaiola Hospital, Tonga.		SCALE 1/100
DRAWING NO. M-2	DRAWING NAME: HOT WATER PIPING		
	DATE: June '82	SENIOR ARCHITECT: T. Sato	CHECKED: T. Kuno	DRAWN: EO

ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.
4-6-12, KUDAN MINAMI, CHIYODA KU, TOKYO, JAPAN TELEPHONE: TOKYO (03) 262-7161



MACHINE SCHEDULE

NO.	EQUIPMENT NAME	DESCRIPTION	Q'TY	REMARKS
AC-1	AIR CONDITIONER	WINDOW TYPE COOLING CAP. 4,000 kcal/hr COMP. 1ø 240V × 1.5 KW FAN 1ø 240V × 0.12 KW ACCESSORY : SUN SHADE	3	
AC-2	AIR CONDITIONER	WINDOW TYPE COOLING CAP. 2,800 kcal/hr COMP. 1ø 240V × 1.1 KW FAN 1ø 240V × 0.05 KW ACCESSORY : SUN SHADE	2	STAND-BY
CF-1	CIRCULATION FAN	CEILING TYPE 900ø FAN 1ø 240V × 0.1 KW ACCESSORY : CONTROL BOX	4	
EF-1	EXHAUST FAN	WINDOW TYPE 250ø FAN 1ø 240V × 0.06 KW ACCESSORY : WEATHER COVER	1	

JAPAN INTERNATIONAL COOPERATION AGENCY			
JOB NO. MCF 82-16	TITLE OF THE PROJECT	Extension of The Health Laboratory of Vaiola Hospital, Tonga.	
DRAWING NO. M-3	DRAWING NAME	AIR-CONDITION & VENTILATION EQUIPMENT	SCALE 1/200
	DATE June '82	SENIOR ARCHITECT	CHECKED DRAWN

ISHIMOTO ARCHITECTURAL & ENGINEERING FIRM, INC.
4612, KUDAN MINAMI, CHIYODA KU, TOKYO, JAPAN TELEPHONE : TOKYO (03) 262 7161

C. 資　機　材

資機材については，

1) LABORATORY FURNITURE

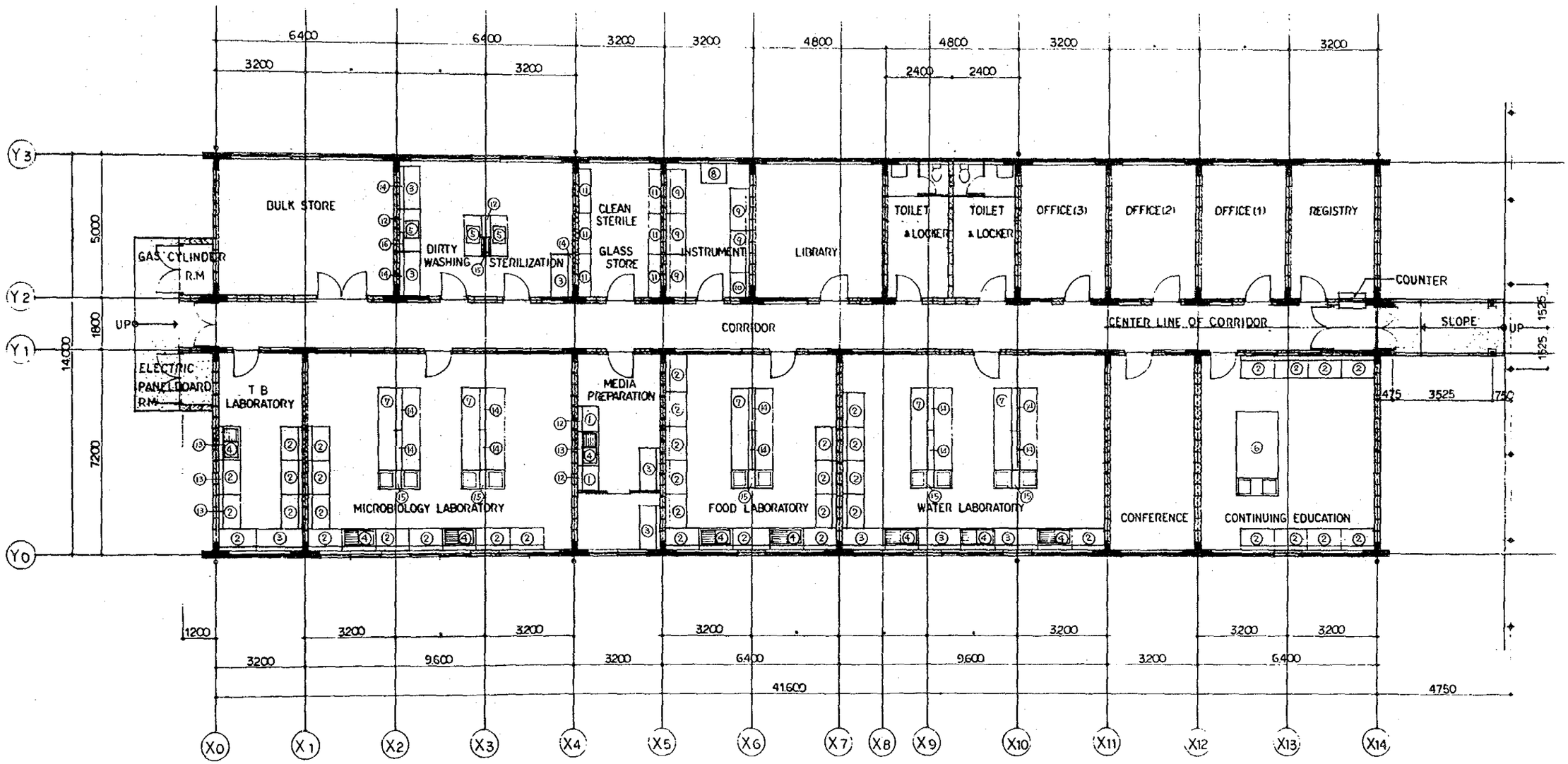
2) AIR-CONDITION & VENTILATION MACHINE

3) MEDICAL EQUIPMENT

の３種類に大別し，費用の概算を掲げる。

1) LABORATORY FURNITURE LIST

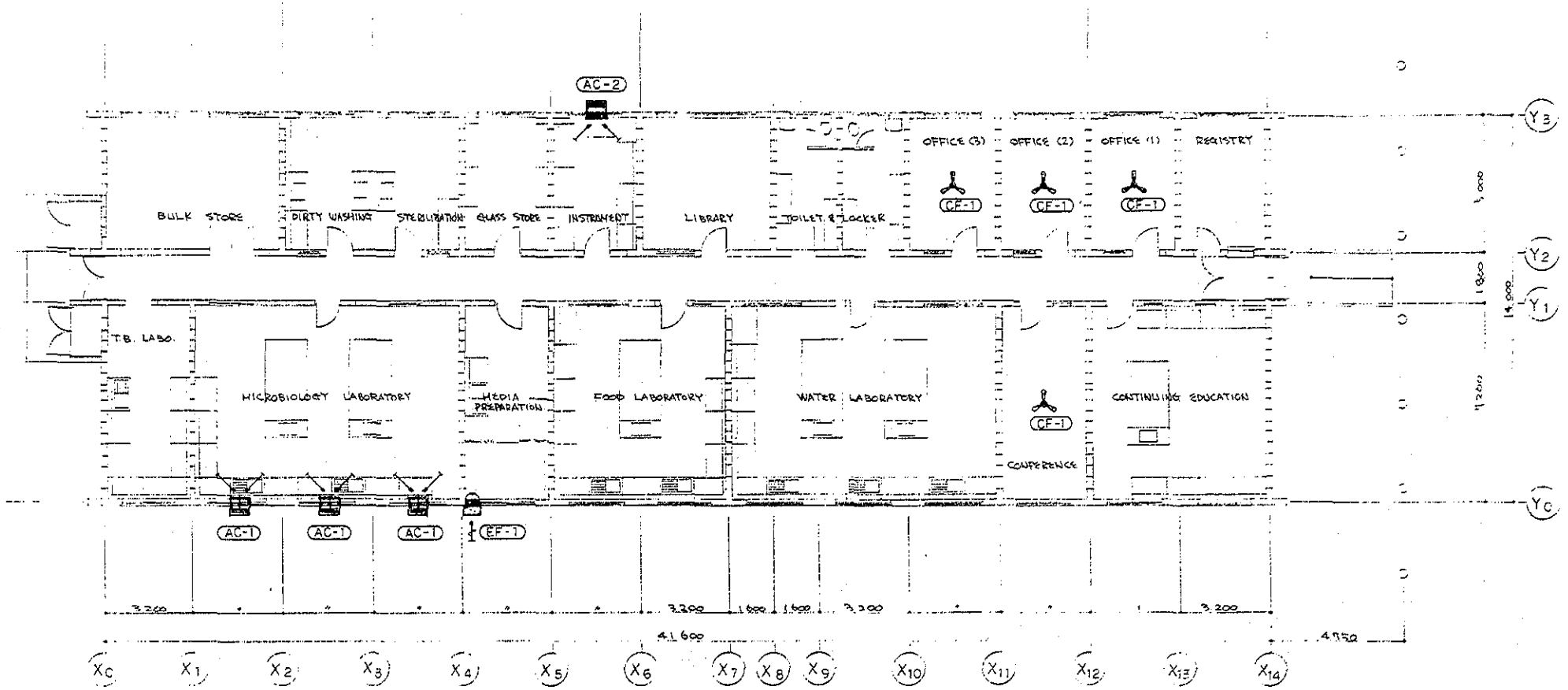
NOS.	DESCRIPTION	SPECIFICATION					Q'TY
		L		W		H	
1	Working Table	900	x	750	x	900	2
2	-ditto-	1200	x	750	x	900	38
3	-ditto-	1500	x	750	x	900	9
4	Sink Unit	1200	x	750	x	900	9
5	-ditto- (center sink)	1500	x	750	x	900	3
6	Center Table w/sink	3000	x	1500	x	900	1
7	-ditto-	3600	x	1500	x	900	5
8	Balance Table	900	x	750	x	750	1
9	Microscope Desk	1500	x	750	x	700	5
10	Mensurable Desk	900	x	750	x	750	1
11	Shelves (elector shelves)	1520	x	460	x	1830	6
12	Shelves	900	x	300	x	860	4
13	-ditto-	1200	x	300	x	860	4
14	-ditto-	1500	x	300	x	860	13
15	Pegboard (both sides)	600	x	330	x	800	6
16	-ditto- (single side)	600	x	165	x	800	1



LABORATORY FURNITURE PLAN

2) AIR-CONDITION & VENTILATION MACHINE LIST

NOS.	DESCRIPTION	SPECIFICATION	Q'TY	REMARKS
AC-1	Air Conditioner	Window Type Cooling Cap. 4000 Kcal/Hr Comp. 1^{ϕ}240V x 1.5KW Fan 1^{ϕ}240V x 0.12KW Accessory: Sun Shade	3	
AC-2	Air Conditioner	Window Type Cooling Cap. 2800Kcal/Hr Comp. 1^{ϕ}240V x 1.1KW Fan 1^{ϕ}240V x 0.08KW Accessory: Sun Shade	2	Stand-by
CF-1	Circulation Fan	Ceiling Type 900 Fan 1^{ϕ}240V x 0.1KW Accessory: Control Box	4	
EF-1	Exhaust Fan	Window Type 250 Fan 1^{ϕ}240V x 0.06KW Accessory: Weather Cover	1	


AC-2
BULK STORE
DIRTY WASHING
STERILISATION
GLASS STORE
INSTRUMENT
LIBRARY
TOILET & LOCKER
OFFICE (3)
OFFICE (2)
OFFICE (1)
REGISTRY
CF-1
T.B. LAB.
MICROBIOLOGY LABORATORY
MEDIA PREPARATION
FOOD LABORATORY
WATER LABORATORY
CONFERENCE
CONTINUING EDUCATION
AC-1
EF-1
Y3
Y2
Y1
YC
XC
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
X12
X13
X14
3200
1600
41600
4750
14000
5000
1800
1200

3) MEDICAL EQUIPMENT LIST

NOS.	DESCRIPTION	MANUFACTURE / MODEL / SPECIFICATION			Q'TY	PRIORITY
1	High-Pressure Steam Sterilizer	"UDONO"	KRSC-559	manual type	2	A
2	Drying Oven	"HIRASAWA"	FFS-8	50°C-220°C	1	A
3	Hardwater Softener	"ORGANO"	TSF-5	Max. 4M^3/h	1	A
4)	Purewater Producing Apparatus	"YAMATO"	WG-32 + CW-41 + AS-21		1	A
5						
6	Hot Air Sterilizer	"HIRASAWA"	GS-10ET	∿ 220°C	1	B
7	Boiling Sterilizer	ACOMA"	S-045	45x36x30cm	1	A
8	Supply Trolley	"ERECTA"	UTT1-S	3 shelves	4	A
	- ditto -,	"	"	Color: Red	2	A
9	Incubator	"HIRASAWA"	H-6-C	60x50x60cm	2	B
	- ditto -,	"	H-8-C	80x50x60cm	2	A
	- ditto -,	"	H-10-C	100x50x70cm	1	A
	- ditto -, water jacket	"	WJ-62	37x38x58x2	1	A
10	Refrigerator	"SONYO"	SR-224JC	239 liter	5	A
11	Muffle Furnace	"TOYO KAGAKU"	ESF-3 ELP		1	A
12	Analytical Balance	"CHYO"	CT$_3$-200D	0.1mg-220g.	1	B
13	Conductivity Meter	"WHITNEY"	CTU-3B	w/12V battery	1	C
14	Turbidity Meter	"NIHON SEIMITSU"	PT-205	0.1-1000mg/L	1	B
15	Drying Oven	"HIRASAWA"	FFS-8	50°C-220°C	1	A
16	Low Temperature Incubator	"	HL-2S	60x50x60cm	1	C
17	Spectrophotometer	"NIHONBUNKO"	UVIDEC-320		1	B
18	Microplate Photo-meter	"NISSEISANGYO"	MTP-12		1	A
19	PH Meter	"HITACHI"	F-7ssII		1	A
20	Deep Freezer	"SANYO"	MDF-330	- 30°C	1	A
21	- ditto -,	"	MDF-380AT	-80°C	1	A
22	Microkjeldahl Apparatus	USA Chemistry Standard			1	A

NOS.	DESCRIPTION	MANUFACTURE / MODEL / SPECIFICATION	Q'TY	PRIORITY
23	Binocular Microscope	"OLYMPUS" BHS-113	4	A
24	Phase-contrast Microscope	" BHT BH2-PC-PA-2-DC	1	B
25	Centrifuge	"HITACHI" SCR-20B 20,000RPM	1	A
26	Water Bath	"HIRASAWA" WT-5A + W-5-C	2	A
27	Serum Protein Electrophoresis Apparatus	"HIRANUMA" EP-300B	1	A
28	Bilirubin Meter	"ERMA" 333	1	A
29	Medical Refrigerator	"SANYO" MBR-505	1	A
30	PCV Instrument	"ERMA" ACM-701-05	1	B
31	Student Microscope	"OLYMPUS" CHB-213	8	A
32	Type Writer with stand	"OLIVETTI" ET121 Electric	1	A
	- ditto -,	" PRESSMAN	1	A
33	Electronic Calculator with printer	"CANON" P1440-D	1	A
	- ditto -,	" P10-Dm	2	A
34	Copy Machine	"MINOLTA" EP-320 ∿ A3	1	A
35	Vehicle	"TOYOTA" LITEACE 5-door	1	A
36	Stabilizer	"KIKUSUI" PCH100-20	1	A
37	Teaching Microscope for cytoloty	"OLYMPUS" BHS-MDO-3, BH2-MDO-G	1	C
38	Blood Gas Analyzer	"KAYAGAKI" Shorander type	1	A
39	Clean Bench	"HITACHI" PCH-1302-CNG	1	A
	- ditto -,	" CCV-1301-EC	1	B
40	Draft Chamber	"KYORITSU" SA-2F-120	1	A

SUPPLEMENTARY EQUIPEMNT LIST

NOS.	DESCRIPTION	MANUFACTURE / MODEL / SPECIFICATION		Q'TY	PRIORITY
1	Flame-Photometer			1	B
2	Topload Balance	"CHYO"	SDT-200 10mg.	1	B
3	Dispenser	"HIRASAWA"	JS-10, 20	12	B
4	Dispenser Stand	"	JFB	2	B
5	Supersonic Wave Cleaner for pipette	"SHARP"	UT55	1	B
6	Homogenizer	"IKEMOTO"	HED-2	1	B
7	Stomacher	"ORGANO"	400	1	B
8	Hydrometer			1	B
9	Densito Meter	"TOYO"	DMU-33-C	1	B

Remarks: Priority A - First, B - Second, C - Third

Power Supply: AC 240V 50Hz.

Manufacturer and Model of No. 23, 24, 31, 35 are fixed.
Others can be offered equivalent.

1982 年 5 月

2 資 機 材 費 (Estimation of Equipment)

			円
1. LABORATORY FURNITURE	一	式	14000000
2. AIR-CONDITION & VENTILATION MACHINE	一	式	1510000
3. MEDICAL EQUIPMENT			
1) EQUIPMENT	一	式	47700000
2) SUPPLEMENTARY EQUIPMENT	一	式	5400000
資機材費合計 (Total)			68,610,000

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