タイ・カセサート大学農業普及・機械化計画
試験圃場整備工事に係る施工管理業務報告書

昭和59年6月

国際協力事業団

はじめに

本事業は タイ・カセサート大学農業普及・機械化計画の一環として、農業機械化センターに属する試験圃場の整備を行ない、当センターの行なう (1) 農業機械化推進に必要な諸条件の調査方法の確立、(2) 農業機械器具の改良・鑑定に必要な測定法の確立、(3) 農業機械化研修の実施の指導 に供するために実施されるものである。

圃場の現況は、未耕地であり 不陸も多く、また、用排水施設がないため、上記目的を遂行するには支障を来たしている。 今回、本事業によって、用排水施設、区画整備、農道等が完備されると、年間を通しての かんがい および 排水が可能となり、また、ほ場も畑地 および 水田も造成されるので、本来業務の目的達成により以上の効果をもたらすことが期待される。

目　次

第 1 章

第1章　概要

本報告書は，国際協力事業団（JICA）の委託により日本技研株式会社が行なった「タイ・カセサート大学農業普及農業機械化計画」の一環である機械化試験圃場のモデルインフラ整備工事における施工管理業務をとりまとめたものである。　業務実施の概要は次の通りである。

(i) 業務実施場所

JICA バンコク事務所	契約に到るまでの業務
カセサート大学カンペンセンキャンパス（ナコンパトム県）	工事実施における施工管理業務

(ii) 派遣専門家および派遣期間

湯川義光（日本技研株式会社）
昭和58年12月23日～昭和59年2月19日
（60日間）

野添浩秀（日本技研株式会社）
昭和59年1月23日～昭和59年6月20日
（150日間）

(iii) 実施設計書および図面

昭和58年10月に提出された本件に関する調査実施設計報告書および図面集（日本技研株式会社）による。

(IV) 工事規模の概要

1. ほ場の対象面積	9.6 ha
2. 用水路	
2-1. コンクリート フリューム タイプ	105 m
2-2. コンクリート ライニング タイプ	972 m
3. 排水路	
3-1. コンクリート ライニング タイプ	201 m
3-2. 土水路	1,261 m
4. 農道	
4-1. 幹線道路 (6m)	702 m
4-2. 支線道路 (4m)	1,679 m
5. ポンプ施設	
5-1. 深井戸 (φ200㍉) 掘削	120 m
5-2. ポンプ場 上屋	1 式
5-3. ポンプ (水中モーターポンプ)	1 式
6. ほ場内配管	
6-1. 幹線 (φ 100㍉, GSP)	350 m
6-2. 支線 (φ 80㍉, GSP)	244 m
7. 附帯工	
7-1. 取水工	1 ヶ所
7-2. ほ場内 カルバート	9 ヶ所
7-3. 分水工	24 ヶ所
7-4. トラクタ 進入路	24 ヶ所
7-5. 未舗装排水路 カルバート	1 ヶ所

(V) 工事実施期間

昭和59年2月5日～昭和59年6月15日

(VI) 工事請負契約会社

Thai Takenaka International Ltd.
Beamitr Bldg. 5th Floor, 138 Silom Road, BKK
Tel. 233387, 2333246

(vii) 契約締結日

昭和○○年11月26日

(viii) 契約金額及び支払い

契約金額		2,300,000 ฿
前　払	(30%)	690,000 ฿
中間払	(40%)	920,000 ฿
最終払	(30%)	690,000 ฿

第 2 章

第2章　モデルインフラ整備工事関係書類

2-1.　相手国からの受諾書

2-2.　日上書の交換

資料2－3

様式－1

プロジェクト基盤整備費申請書

昭和48年11月29日

国際協力事業団
総裁 有田圭輔 殿

バンコック 事務所長
氏名 河西 明 ㊞

下記によりモデルインフラ整備費・パイロットインフラ整備費の支給を申請する。

記

(1) プロジェクト名　タイ国 カセサート大学 農業普及・機械化計画
(2) 工事名　試験圃場 かんがい施設整備の工事
(3) 概算工事費　35,000,000円
(4) 工事内容
A) 工事概要

別添のとおり。

B) 主要工事数量

別添のとおり

C) 工期

昭和48年12月 日～昭和49年 5月 日間 (6ヶ月間)

(5) 申請の事由

(実施要綱第3条の要件及び工事の目的等を記載すること)

別添のとおり

No.876/83

URGENT

The Embassy of Japan presents its compliments to the Department of Technical and Economic Cooperation and has the honour to acknowledge the receipt of the Department's Note No.1703/33916 dated December 20, 1983 concerning the Agricultural Extension and Mechanization Project in Kasetsart University in Thailand.

The Embassy of Japan has further the honour to accept on behalf of the Government of Japan the proposal set forth in the above-mentioned Note and to agree that the Department's Note and this Note shall be regarded as constituting an agreement between the two Governments.

The Embassy of Japan avails itself of this opportunity to renew to the Department of Technical and Economic Cooperation the assurances of its highest consideration.

EMBASSY OF JAPAN 日本国大使館 THAILAND

December 20, 1983

KASETSART UNIVERSITY
BANGKOK 9, THAILAND.

December 14, 1983

Mr. Akira KASAI
Director, Bangkok Office
Japan International Cooperation Agency
c/o Embassy of Japan

Subject : Request for Cooperation In the Construction of Model Infrastructure

Dear Mr. Kasai:

In accordance with the Record of Discussions pertaining to the Agricultural Extension and Agricultural Mechanization Project, we would like to inform you that the works of the project are now proceeding smoothly under the technical cooperation of the Japanese experts assigned to the Project and that it is a mutual concensus of our staff members and the Japanese experts that construction of model infrastructure in the experimental fields as an integral part of the improvement works is of vital importance for effective implementation of the Project

We would like, therefore, to submit to JICA our request for the necessary assistance in the construction of the said infrastructure.

Hoping for your kind consideration, I remain.

Sincerely yours,

Krisna Chutima

Krisna Chutima
Vice Rector

KC/sv

	JICA

DEPARTMENT OF TECHNICAL AND ECONOMIC COOPERATION
Krung Kasem Road, Bangkok, Thailand
Cable: DTEC.
TEL. 817555

No. 1703/33916

The Department of Technical and Economic Cooperation presents its compliments to the Embassy of Japan and, with reference to the Agricultural Extension and Mechanization Project which is being implemented both by Kasetsart University and the Japan International Cooperation Agency (JICA), has the honour to propose the followings :

1. The Government of Japan will, in accordance with the relevant laws and regulations of Japan, take necessary measures for JICA to supplement a portion of the following local cost expenditure for the execution of the improvement works of model infrastructure in the project area (hereinafter referred to as "the Improvement Works") including, inter-alia, construction works of Model Paddy Field during the period between November 1983, and March 1984, for the purpose of smooth implementation of the aforementioned project.
2. The Government of the Kingdom of Thailand will take the following measures to ensure the successful implementation of the Improvement Works :-

   (a) to secure a lot of land necessary for the Improvement Works and
   (b) To bear all expenses necessary for the execution of the Improvement Works other than that borne by JICA.

The Department of Technical and Economic Cooperation has further the honour to propose that this Note and the Embassy's Note in reply accepting on behalf of the Government of Japan the foregoing proposal shall be regarded as constituting an agreement between the two Governments.

The Department of Technical and Economic Cooperation avails itself of this opportunity to renew to the Embassy the assurances of its highest consideration.

在タイ日本国大使館 接受 DEC 21,1983 RECEIVED Embassy of Japan, Thailand

December 26, B.E. 2526 (1983)

The Embassy of Japan,
Bangkok.

DEC-II/CP
Tel. 2811031

第3章

第3章　工事請負契約に関する事

3-1. 工事予定価格

工事数量及び単価の確定にもとずいて、工事費の積算を行ない、「予定価格下調書」（資料 1-1）を作成し、これにもとずいて所長決裁「予定価格調書」（資料 1-2）を得、2,300,000 バーツを予定価格とした。

3-2. 工事請負業者の選定

本工事の請負業者の選定については、JICA バンコク事務所と協議の結果、（資料 1-3）に示す5社を妥当と認め、指名通知を行なった。

3-3. 現場説明

現場説明は1月10日午後3時、JICA バンコク事務所で行ない上記5社の参加（資料 1-4）を得た。
現地での説明は、各自業者に後程行ってもらう事で了解されたので、説明会で、一般計画平面図及び現場写真を提示し工事内容の説明を行なった。
また、次のものを貸与資料とした。

1. 工事図面集
2. 工事数量明細書
3. 契約書(案)
4. 工事仕様書

また、入札はプロポーザル方式とし、工事見積の詳細内訳書の提出を求め、これを主として総合判断し、1位指名業者を決定する旨を伝えた。
プロポーザル提出日は1月18日午後3時までとした。

3-4. プロポーザルの提出及び契約相手の決定

1月18日午後3時までに5社のプロポーザルが提出された。(資料1-5)
この結果を基に、JICAバンコク事務所と協議して1位指名業者をThai Takenaka International Ltd.と決定し、ただちに価格調整のための交渉に入った。
この結果予定価格(2,300,000バーツ)での合意を得る事が出来た為、再見積書を提出させ、契約相手方を同社に最終決定するに至った。

3-5. 契約

(1) 契約日： 昭和58年1月26日、午後3時より、JICAバンコク事務所所長室に於いてJICAバンコク事務所長 河面明代とThai Takenaka International Ltd.の取締役 友納武嗣代との間で契約調印がなされた。(資料1-6)
また Witness として JICAバンコク事務所 菊地文夫代 および 施工管理業務担当 浦川義光が サインを行なった。

(2) 契約金額： 2,300,000バーツ.
(注. 1バーツ≒10.235円)

(3) 契約工期： 昭和58年2月5日より昭和58年6月15日

(4). 支払い： 支払いは前払，中間払，最終払とし
各々の段階で次の如く支払うものとした。

支払い区分	支払いの時期	割合	支払い金額
前払	契約時	30%	690,000 ฿
中間払	4月末	40%	920,000 ฿
最終払	工事検査完了後	30%	690,000 ฿
計		100%	2,300,000 ฿

(5) 銀行保証

請負業者の銀行保証を契約金の5%
(115,000 ฿)とし，これを東京銀行バンコク支店
にボンドさせた。(資料 1-7)

第 4 章

第4章　供与機材に関する事

4-1. 機材の種類

モデルインフラ整備工事予算以外に、昭和59年　月　日に
末達された　現地到達供与機材は下記の通りである。

1. 深井戸用ケーシング　　φ200㎜×120m

2. 深井戸用ポンプ
   - 水中モーターポンプ（30kW）　Q=0.65㎥/min, H=130m
   - ケーブル・井戸蓋・吐出油管・空気弁・逆流防止弁・水位計
   - バルブ　φ80制水弁・φ80逆止弁・φ100制水弁
   - 揚水管　φ80㎜　88m
   - 制御盤　屋外仕様・自立形
   - 圧力タンク　1㎥立形・鋼製
   - ポンプ廻り配管

3. ほ場内配管
   - φ100直管　350m
   - φ80　〃　216m
   - φ100エルボ　9ヶ
   - φ80　エルボ　3ヶ
   - φ100　T字管　8ヶ
   - ストップバルブ　5ヶ
   - 可撓管　φ100　10ヶ

4-2. 購入金額

上記について、それぞれ見積り及び相見積りを徴収し、検討の結果次のものを購入する事の承認を受けた。

1. 深井戸ケーシング
   購入先： UNITED WATERWELL CONSTRUCTION LTD.
   購入金額： 218,000 バーツ

2. 深井戸用ポンプ 1式
   購入先： SIAM TRADING & INVESTMENT CO., LTD
   購入金額 585,000 バーツ

3. 場内配管 1式
   購入先 ： CHOR SAMPAN COMPANY LIMITED
   購入金額： 95,000 バーツ

4-3. 供与機材関係書類 （第6章 資料編参照）

(1) A4フォーム
(2) 機材購入申請書
(3) 契約書 （200万円以上のもの）
(4) 最終見積書

第5章

第5章 施工管理に関する事

5-1. Inspection Committee

工事施工管理業務を遂行する上で Contractor は Inspection Committee の指示によらねばならない契約となっている。 Inspection Committee のメンバーは次の者が JICA バンコク事務所長 から 選任を受けた。

1. Fumio KIKUCHI : Assistant Resident Representative, JICA BKK OFFICE
2. Hichiro IMAIZUMI : Leader of A.M.C. in K.U.
3. Toshio OSHIRO : JICA Coodinator in K.U.
4. Banchaw Bahakoyotin : Chief of A.M.C.
5. Yoshimitsu YUKAWA : Supervisor of the Construction
6. Hirohiko NOZOE : - do -

なお、Hichiro IMAIZUMI は、3月末日に Leader of AMC in KU の任期が終了したため、その後は 後任の Kiyohisa OGAWA が 選任を受けた。また、Yoshimitsu YUKAWA は、2月19日 まで その任に当た。

5-2 施工管理.

施工管理に関し、工程管理、品質管理、安全管理の諸点から本モデルインフラ整備事業を検討する。

1. 工程管理.

工程管理は、昭和58年10月に提出された本件に関する調査実施設計書（日本技研株式会社）をもととし、契約書類（TERMS AND CONDITIONS OF THIS CONTRACT Section 2）に基づき業者側より提出させた工程表に沿って工程管理を行った。また、4月30日に工程を再検討し5月1日からの工程を立てなおした。

工事は、全体的に遅れ気味であったが、5月下旬から6月上旬にかけて、以下に示す対応策を講じ、繰越工期内の工事完了を行なうことができた。

工事が遅れ気味であった理由として

i) 労働者自身の工程管理意識が低い。

ii) 重機の稼動率が低い（故障が多い、オペレーターの技能が低い）

ことなどが考えられる。

これに対して、5月下旬より着手した用水路コンクリートライニング工事において、工事消化のポイントと考えられたコテ仕上げの職人を確保し、生コンの輸送手段である小型トラックを1台から2台に増した。また5月下旬までには、重機を使って行なう工事（ランドレベリング、農道の路体工事）がほぼ終了した。この工事に使った重機はトラクターショベル、バックホー、トラック（生コン運搬）等であるが、ともに故障などのトラブルが多く、オペレーターの技能にも問題があると考えられた。5月下旬からは、労働者の増員によって工事の消化が行なえる用水路掘削が主たる工事であったためスムーズな工程管理と工事の遅れをとりもどすことができた。

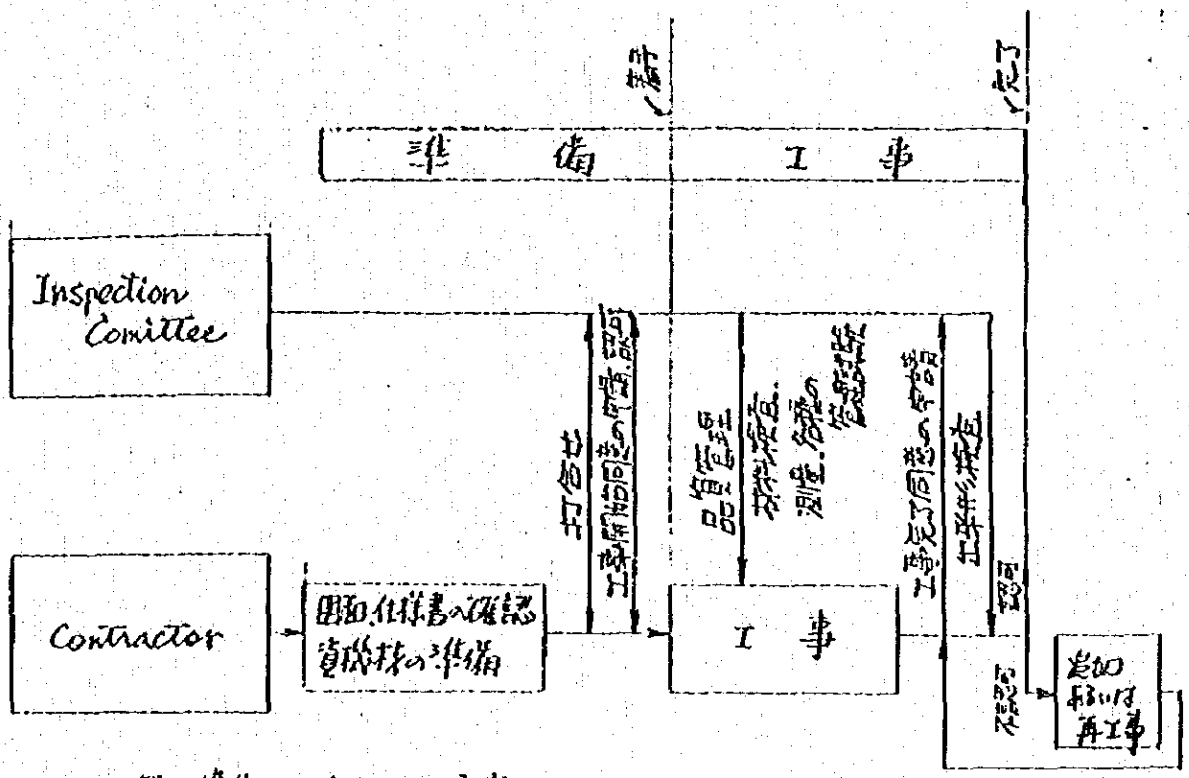
工程表と実際の工程を次頁に示す。

工 程 表.

項目 ＼ 年月	1983年 12月	1984年 1月	2月	3月	4月	5月	6月	備考
入札契約関係								
仮設工								
ランドレベリング 及び面整理								
用水路								
排水路								
農道								
ポンプ								
圃場配管								

2. 品質管理.

請負業者が設計内容及び設計図を十分理解し工事を進める事のできるように、下記のフローチャートに対事務手続を行なった。



(1) 位置、構造物の寸法及び標高.

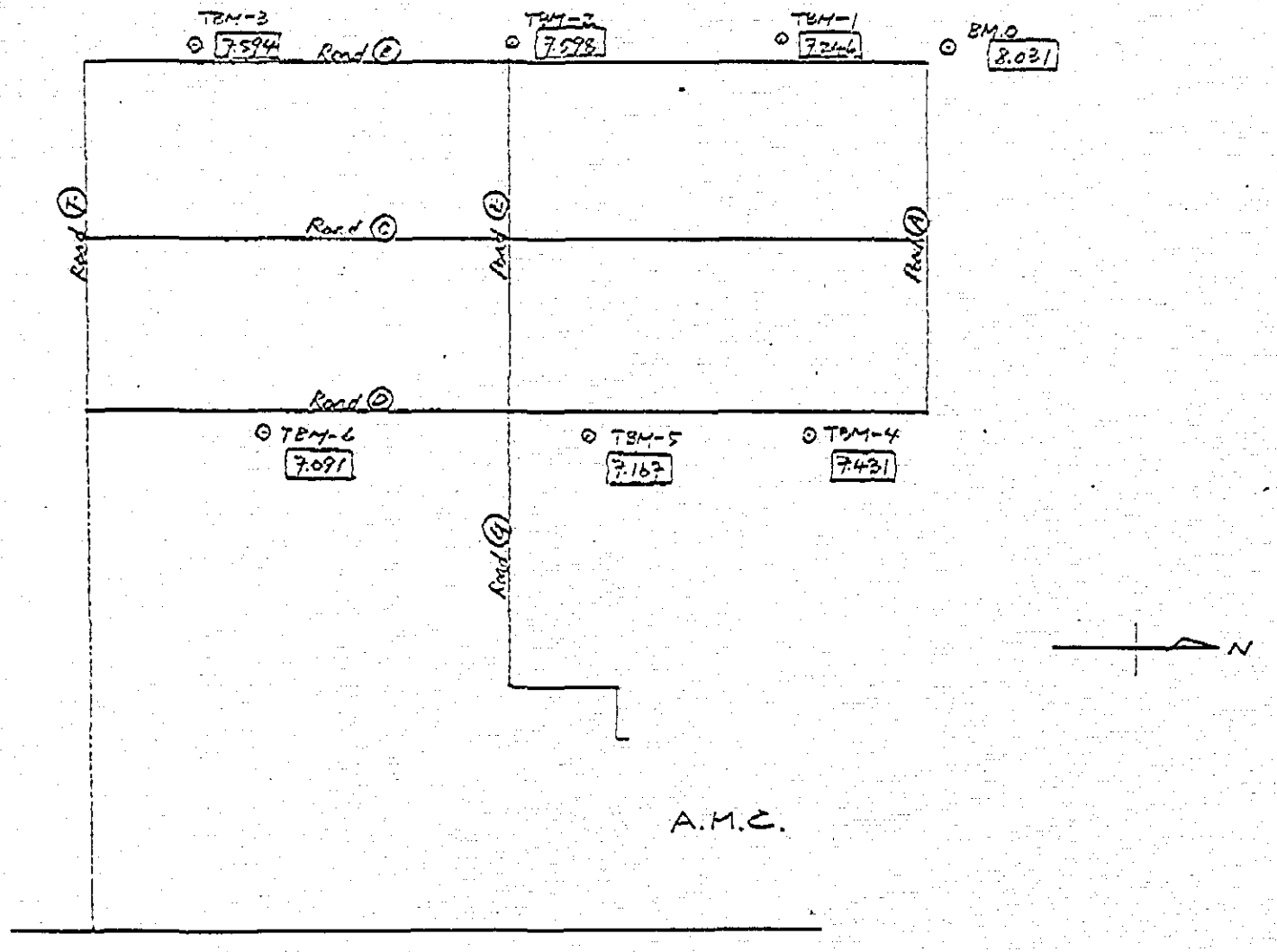
ランドレベリング、区画整理、用排水路、農道など各工事で、位置、構造物の寸法及び標高を確認することが必要である。そのために、測量技術者2名を含む5名の専門従事者を配置し、工事進行に従い随時測量を行ない確認させた。

測量には、トランシット、レベル、スチールテープ等を使用した。

標高の基準点として、昭和58年10月に提出された本件に関する調査実施設計書(日本技研株式会社)より、TBM NC-1 (EL 7.975)より、現場に4ヶ所の仮BMを設定した。(下表参照)

仮BMのNO.	標高	位置
TBM-1	7.246	Road B1の用水中央
2	7.598	Road BとRoad Eの交点
3	7.594	Road B2の用水中央
4	7.431	Road D1のRoad Aより
5	7.167	Road D1のRoad Eより
6	7.091	Road D2の用水中央.

T.B.M's Position & Elevation.



（2） ランドレベリング及び区画整理.

ランドレベリング工事は、土工量が多いため 工事の主体である掘削-積込み-運搬-まき出し-整地は 機械施工を行なった。使用した機械は 下表のとおりである。また、区画整理工事は、小規模な土工事であるため人力施工によった。

ランドレベリング工事に 使用した機械

名称、規格	作業	備考
トラクターショベル 2㎥	掘削、積込み	D60S
ダンプトラック 10ton	運搬	7台
モーターグレーダー	まき出し、整地	HD37S
トラクター	攪拌	

ランドレベリング工事は、耕圃場として その目的をはたすことが必要であるため、次の点に留意して 施工を行った。

(a) 表土扱い(作土層の保全)

工事完了後の地力の低下あるいは生育ムラを防止するために、表土(作土層)を考慮した施工を行った。

- ブルドーザーによる掘削は、高位部を全面的に行なわず前方に行ない、整地作業は 掘削していない部分の土を掘削部分に埋戻す形で行った。
- 低位部その盛土は、搬入土と現地盤の表土を プラウによって 耕起、混合させることとした。
- 仮間作業によって集積した雑草などを、圃場に乾燥、焼却し圃場に還元させた。

現在まで、本圃場は水の手当が十分でないため、年間のうち約4ヶ月の間トウモロコンの作付を行っているにすぎない。そのために 表土(作土層)が十分に形成されているとは認めがたい。しかし、上記のような表土を考慮した施工に加え、本圃場の土壌は 肥沃であるということや、今後の作付、水や施肥等の化学作用や耕起等の物理作用によって、地力低下は 大きな問題とならないものと考えられる。

(b) 田畑輪換のブロック

将来水田として利用を考えているブロックのランドレベリング工事は、盛土部における湛水後の沈下が予想されるため次の指示をした。

- 整地工における許容限界 ±5cm (Technical Specifications 5-03) の時りは、用水路側が盛土、排水路側が切土に当たる場所では注意すること。
- 盛土高さが 20cm を超える部分については、計画標高より 20cm 低い部分の転圧を行ない、この部分を人為的な耕盤とし、湛水後の沈下を防ぐこと

(3) 用排水路工事

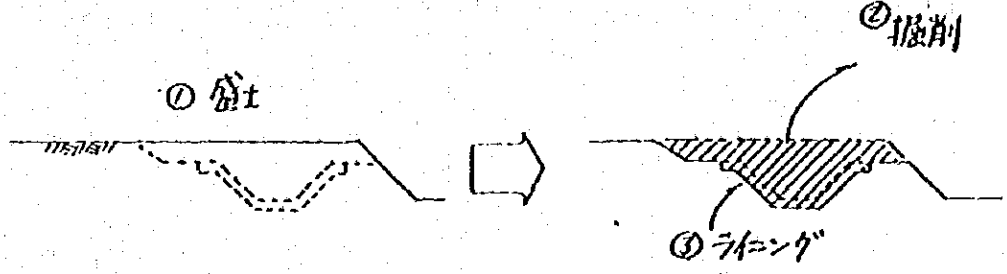
(a) コンクリート工事

用排水路工事のうち、鉄筋コンクリートによる部分は、用水路 A-LINE と、用水路と圃場への進入路あるいは 道路 E-LINE が交差する暗渠である。

また、無筋コンクリートによる部分は、用水路 BC-LINE と排水路 F1, F2 LINE である。

これらコンクリート工事の品質管理は、契約書類「TECHNICAL SPECIFICATIONS 7-07」に基づいた配合を 確実に行なうことが基本である。したがって ポータブルコンクリートミキサーへ投入するまでのセメント、骨材等の計量に 注意するとともに、任意に コンクリート圧縮試験を行ない品質管理に努めた。

また、用水路工事は 農道の路床工事において、用水路の基礎部分を同時に施工することによって、十分転圧されたあと 掘削、ライニングを行った。(下図参照)



(c) その他工事

土工事の盛土については、散水を行って タンパーによって転圧を行った。

また、掘削については、規模が小さいこともあり、土の自立高さ内であったことや地下水の浸出も ほとんどなかったことから、問題はなかった。

(4) 農道工事の品質管理.

(a) 土質試験

農道工事に使用する土取場からの搬入土の物理的性質を把握し、盛土の施工管理基準を設定するために、下表に示す土質試験を行った。

試験項目	対象材料
土粒子の比重試験 (JIS A 1202) 土の含水量試験 (JIS A 1203) 土の粒度試験 (JIS A 1204) 土の液性限界試験 (JIS A 1205) 土の塑性限界試験 (JIS A 1206) 突固めによる土の締固め試験 (JIS A 1210)	路床材料 (土取場からの搬入土) Reservior
現場における土の単位体積重量試験 (JIS A 1214)	舗装材料(ラテライト)

各試験結果は、「6-4 その他参考となる資料」に示す。

(b) 路床工事の品質管理.

上記の土質試験より、路床材料は、統一分類法において ML、CL-ML に分類され、塑性の低い無機質のシルトが主体となり その中に細砂、粘土質のシルトが、含まれている。

粒度分布試験結果より、いわゆる粒度曲線が立っている状態で、粒度のバラツキがなく比較的そろった粒度である。また、含水量の少しの変化で土の性質が急激に変化する性質がある。これは、液性限界試験における流動曲線の傾きが小さいことや、突固めによる土の締固め試験からも 含水比の変化で 乾燥密度も大きく変化することから わかる。

これらの土の性質を把握したうえで、実際の盛土品質管理は、次に示す点に留意して行った。

1) 施工管理基準として、Technical Specifications 5-06 Compaction に示されている必要密度は、突固めによる土の締固め試験(JIS 100% エネルギー)で得られた最大乾燥密度の 90% とし 次のとおりとした。

$$\gamma_d = \frac{1}{3}(1.95 + 1.87 + 1.80) \times 0.90 = 1.68 \fallingdotseq 1.6 \ (t/m^3)$$

なお、必要密度のチェックは、道路延長 500m に 1ヶ所の割合で 合計5ヶ所 現場密度試験を行った。結果は、完了検査資料に示す。

2) まき出し～転圧作業の中で 現場の土が ほぼ最適含水比となるように散水を指示し、路床面の盛土完了後、できるだけ早くラテライト舗装を行ない、表面に発生する乾燥クラックを防いだ。

3) 施工機種は 次のものを使用した。

トラクターショベル ― ダンプトラック ― モーターグレーダー ― 散水車 ― ローラー
2.1 m³ (PC40S) 11 Ton (HD325) 6 Ton 自走式 10 Ton 振動引式 3 Ton

(C) 舗装工事の品質管理.

道路面の舗装は、この地方で多く実施されているラテライト舗装である。

このラテライトの施工管理基準は、文学内ですでに施工済のラテライト舗装の部分（野菜種子生産試験圃場、JICA モデルインフラ整備事業、昭和56年11月 竣工）で 現場密度を測定し、その結果を参考として 次のように定めた。

現場密度結果（平均値） $\gamma_d = 2.1$ に対して、すでに圧密がある程度進行し安定状態になっているものと考えられるため、この値の90%の値

$$\gamma_d = 2.1 \times 0.9 \fallingdotseq 1.9 \ (g/cm^3)$$

を管理基準と定めた。

なお、密度のチェックは、路床工事と同様に 道路延長 500 m に 1ヶ所の割合で 合計5ヶ所 現場密度試験を行った。結果は 竣工検査資料に示す。

施工機種は 次のものを使用した。

ダンプトラック (11 Ton) ― モーターグレーダー (HD325) ― 散水車 6 Ton ― ローラー 自走式：10 Ton

(5) ポンプ据付工事及び圃場配管工事

水中モーターポンプ、圧力タンク及び配管部品は、現地調達供与機材であり、これらの契約時には、品質規準として 次のものを提示し、これらの規準 あるいは同等のものを納入させた。

- Japanese Industrial Standards (JIS)
- Standard of The Japanese Electro-Technical Committee (JEC)
- Standard of Japan Electric Machine-Industry Association (JEM)

(6) 付帯構造物工事

付帯構造物工事は、コンクリート工事と土工事に別けられ、これらの工事の品質管理については、前項(3)用排水路工事と同様に行った。

3. 安全管理.

本工事は特に危険と考えられる工事がないと判断されたため、工事関係者への講習会等を開催しなかった。また、工事中関係者にはすべてIDカードをつけさせ現場への関係者以外の立入りを禁止した。

農道工事、特に幹線道路(B.F-line)の工事に際して、一般車両の通行が支障となる場合や、暗渠工事で通行が不可能な場合、通行止の立看板と車止めの柵を設けて危険防止を行った。

5.3 本施設の使用に関する注意事項

本圃場及び付属施設の使用について注意事項を述べる。

1) 圃場

施工にあたって、工事後の地力低下や生育ムラのないように表土(作土層)を考慮した。工事後の作付にあたり、土壌分析を行ない化学的に土壌改良を行なう方法(ex. 酸性矯正、リン酸補給)や マメ科の作物を作付けるなどの方法によって、一層の地力増加が考えられる。

2) かんがい施設

用水計画は、RID水路からの取水が可能となった場合と、地下水を利用する場合について実施した。単位用水量は、畑地で 1.0 ℓ/sec/ha、水田は 1.7 ℓ/sec/ha とした。

用水路の流量測定は、A1 line と A2 line に設置してある量水標によって、別紙に示す水深ー流量の関係より、チェックを行なうことができる。取水量は、ゲートで調整し 過剰流下を避ける水管理を 行なうことが 望ましい。

地下水の揚水は、水中モーターポンプで 行なう。揚水試験の結果 Q=0.67 m³/min の揚水が可能であることが判明した。この揚水量を維持できる 土地利用計画は、すべて畑地とした場合は 圃場すべて(9.6 ha)、水田と畑地の場合は 水田が 2.2 ha、畑地 7.4 haである。また、水田がしろかき用水を必要とする場合は、畑地への かんがい面積を縮小させて 対応する。

流量は、別添の表によって概略値を 把握することができる。

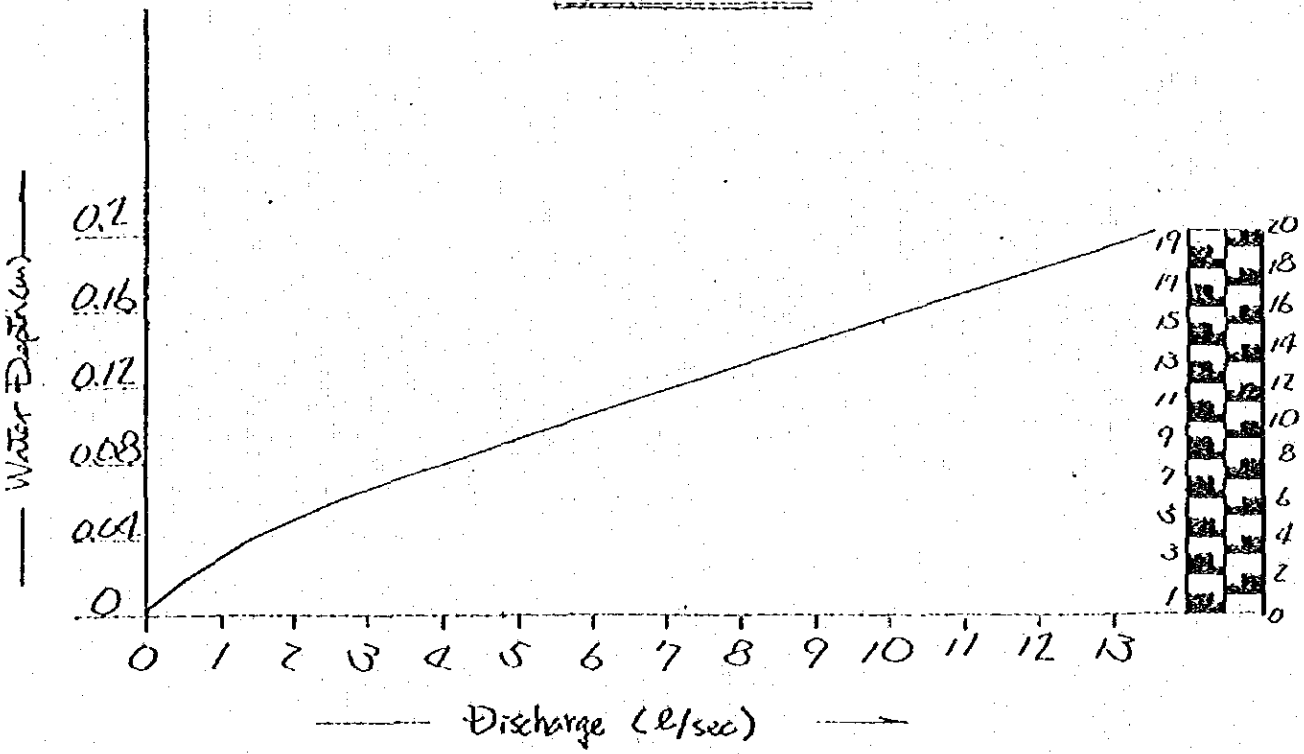
ポンプ操作は、Operation Manual に基づき 誤操作のないように注意が必要である。故障等のトラブルがあった場合の連絡先は 次のとおりである。

KUBOTA TRACTOR THAILAND CO., LTD
NO.39, Viphavadee-Rangsit Road, Kwaeng Samsennai,
Khet phyathai, Bangkok 10400 Tel: 279-4494-5

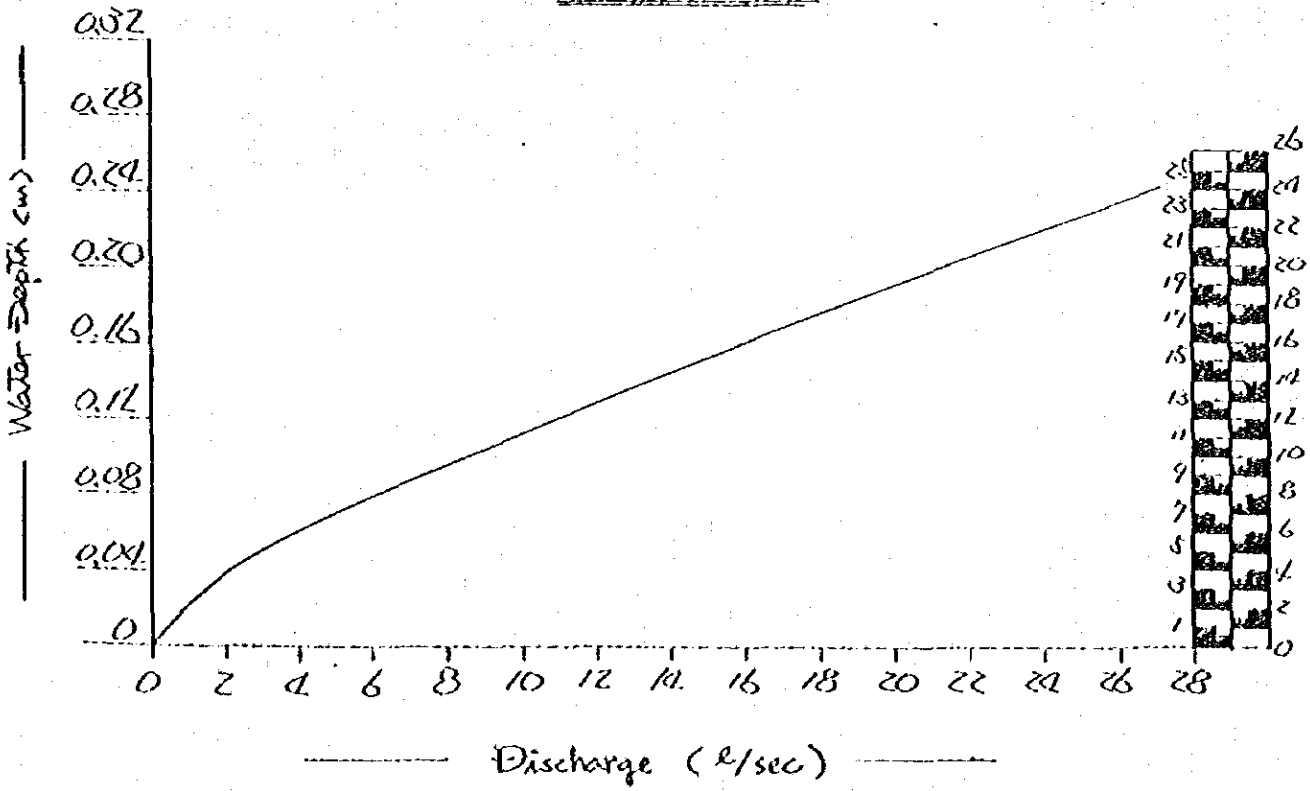
3) 排水施設

土水路の部分(特に F3, F4 line)は、排水に伴なう土砂堆積によって、通水断面の縮小や勾配の変化が予想される。また、コンクリートライニング部分と土水路部分が接する部分においては、土水路の浸食が予想される。これらの点については、土砂の浚渫、草刈りなどの維持管理が 適期に必要であると考えられる。

A-1 Line

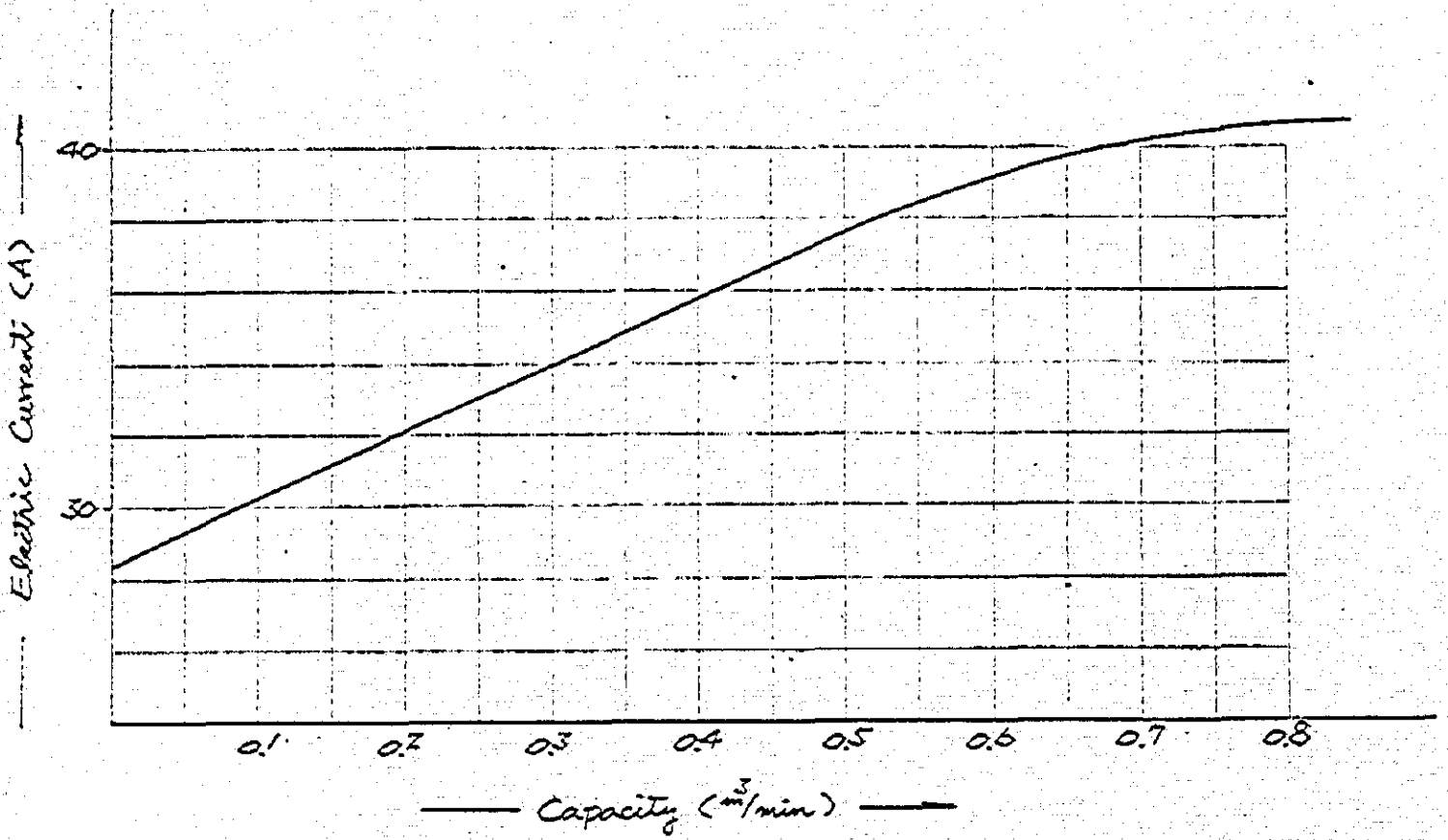


A-2 Line



Submersible Motor Pump

Capacity ~ Electric Current



第 6 章

第6章　資料類

6-1　工事請負契約に関する資料

6-2.　仮設機材に関する資料

6-3.　施工管理に関する資料

6-4.　その他参考資料

6-1. 工事契約に関する資料

予定価格下調書

金 2,300,000 バーツ

件　名　カセサート大学農業部機械化計画
　　　　圃場整備工事

上記のとおり積算しました。

内訳は、別紙予定価格下調内訳書のとおりです。

昭和 59年 1月 18日

国際協力事業団

バンコック海外事務所

菊地文夫

予定価格調書

金 2,300,000 バーツ

件 名: カセサート大学農業機械化計画
圃場整備工事

上記のとおり決定する。

昭和 59年 1月 18日

国際協力事業団

契約担当役

バンコック事務所

所長 河西 [illegible] ㊞

タイ・カセサート大学・農業普及・機械化計画
圃場整備工事　予定価格　算定資料

昭和57年　1月

目次

CONSTRUCTION COST

A. Direct

		COST
1.	Land shape adjustment and land levelling	596,000 ฿
2.	Irrigation canals	191,000 ฿
3.	Drainage canals	133,000 ฿
4.	Farm roads	266,000 ฿
5.	Construction of pumping system	236,000 ฿
6.	Set-up of water supply pipe	17,000 ฿
7.	Appurtenant structures	311,000 ฿
8.	Common temporary work	170,000 ฿
	Sub Total	1,920,000 ฿

B. Indirect

1.	Overhead	115,000 ฿
2.	Profit	183,000 ฿
3.	Tax	88,000 ฿
	Sub Total	386,000 ฿
	Total	2,306,000 ฿
	Round off	(-) 6,000 ฿
	Construction Cost	2,300,000 ฿

BILL OF QUANTITES

No. 1

Item No.	Description	Unit	Quantity	Unit Price (฿)	Price (฿)	Remarks
1. Land shape adjustment and land levelling						
1-1. Land levelling						
(1) M-a Block						
101	Excavation	cum	300	17.8	5,340	Bull L=25m
102	Spreading	"	300	8.8	2,640	M-a Block
103	Spreading	"	4,350	8.8	38,280	From M-d Block
104	Sub-Total				46,260	
(2) M-b Block						
105	Excavation	cum	800	17.8	14,240	
106	Spreading	"	800	8.8	7,040	M-b Block
107	Spreading	"	1,127	8.8	9,918	From M-d Block
108	Sub-Total				31,198	
(3) M-c Block						
109	Excavation	cum	350	17.8	6,230	Bull L=25m
110	Spreading	"	350	8.8	3,080	M-c Block
111	Spreading	"	2,400	8.8	21,120	From M-d Block
112	Sub-Total				30,430	
(4) M-d Block						
113	Excavation	cum	8,300	17.8	147,740	
114	Loading	"	8,199	19.7	161,520	
115	Hauling	"	4,451	17.5	77,893	to M-a Block
116	Hauling	"	1,247	16.1	20,077	to M-b Block
117	Hauling	"	2,501	15.4	38,515	to M-c Block
118	Sub-Total				445,745	
119	Total				553,633	

BILL OF QUANTITES

No. 2

Item No.	Description	Unit	Quantity	Unit Price (₱)	Price (₱)	Remarks
1-2. Land Shape Adjustment						
(1) M-a Block						
120	Excavation	cum	52	30.8	1.602	Man Power
121	Embankment	"	153	21.5	3,290	Man Power
122	Smoothing of face excavated or filled up	sqm	1,193	1.5	1,790	
123	Sub-Total				6.682	
(2) M-b Block						
124	Excavation	cum	27	30.8	832	
125	Embankment	"	147	21.5	3,161	
126	Smoothing of face excavated or filled up	sqm	802	1.5	1,203	
127	Sub-Total				5,196	
(3) M-c Block						
128	Excavation	cum	52	30.8	1,602	
129	Embankment	"	153	21.5	3,290	
130	Smoothing of face excavated or filled up	sqm	1,193	1.5	1,790	
131	Sub-Total				6,682	
(4) M-d Block						
132	Excavation	cum	52	30.8	1,602	
133	Embankment	"	153	21.5	3,290	
134	Smoothing of face excavated or filled up	sqm	1,193	1.5	1,790	
135	Sub-Total				6,682	

BILL OF QUANTITES

No. 3

Item No.	Description	Unit	Quantity	Unit Price (฿)	Price (฿)	Remarks
1-3.	Miscellaneous Construction Works	Ls	1		17,366	5% of (1-1 x 1-2)
136	Total				596,241	
					596,000	Round off

BILL OF QUANTITES

No. 4

Item No.	Description	Unit	Quantity	Unit Price (₿)	Price (₿)	Remarks
2.	Irrigation Canal					
2-1.	A-1 Line					
201	Excavation	cum	4	30.8	123	Man power
202	Embankment	"	2	21.5	43	Man Power
203	Foundation concrete	"	0.2	1.226.9	245	
204	Reinforced concrete	"	0.5	1.320.2	660	
205	Reinforced iron bar	kg	33	13.2	436	
206	Form	sqm	9	289.6	2.606	
207	Sub-Total				4.113	
2-2.	A-2 Line					
208	Excavation	cum	43	30.8	1.324	
209	Embankment	"	25	21.5	538	
210	Foundation concrete	"	2.8	1.226.9	3.435	
211	Reinforced concrete	"	7.0	1.320.3	9.242	
212	Reinforced iron bar	kg	371	12.7	4.897	
213	Form	sqm	108	289.6	31.277	
214	Sub-Total				50.713	
2-3.	B-1 Line					
215	Embankment	cum	36	21.5	774	Man Power
216	Smoothing face of filled up	sqm	376	1.5	564	
217	Lining concrete	cum	10.9	1.321.9	15.063	
218	Metal form	sqm	129	113.2	14.603	
219	Wooden form	"	1.8	289.6	522	
220	Sub-Total				31.526	

BILL OF QUANTITES

No. 5

Item No.	Description	Unit	Quantity	Unit Price (฿)	Price (฿)	Remarks
2-4. B-2 Line						
221	Embankment	cum	36	21.5	774	
222	Smoothing face of filled up	sqm	370	1.5	555	
223	Lining concrete	cum	10.8	1.321.9	14.925	
224	Metal form	sqm	1.8	289.6	521	
225	Wooden form	"	128	113.2	14.490	
226	Sub-Total				31.265	
2-5. C-1 Line						
227	Embankment	cum	37	21.5	796	
228	Lining concrete	"	11.7	1.321.9	16.168	
229	Metal form	sqm	130	113.2	14.716	
230	Wooden form	"	1.9	289.6	550	
231	Smoothing face of filled up	"	389	1.5	584	
232	Sub-Total				32.214	
2-6. C-2 Line						
233	Lining concrete	cum	11.4	1.321.9	15.754	
234	Wooden form	sqm	1.9	289.6	550	
235	Metal form	"	126	113.2	14.263	
236	Embankment	cum	36	21.5	774	
237	Smoothing face of filled up	sqm	379	1.5	569	
238	Sub-Total				31.910	
2-7. Miscellaneous Construction Works		Ls	1		9.117	5% of (2-1 to 2-6)
239	Total				191.457	
					191.000	Round Off

BILL OF QUANTITES

No. 6

Item No.	Description	Unit	Quantity	Unit Price (₹)	Price (₹)	Remarks
3. Drainage Canal						
3-1. C-1 Line						
301	Excavation	cum	67	30.8	2.064	Man Power
302	Smoothing face of excavated	sqm	332	1.5	498	
303	Sub-Total				2.562	
3-2. C-2 Line						
304	Excavation	cum	103	30.8	3.172	
305	Lining concrete	"	0.2	1.381.9	276	
306	smoothing face of excavated	sqm	409	1.5	614	
307	Metal form	sqm	2.2	113.2	249	
308	Wooden form	"	0.1	289.6	29	
309	Sub-Total				4.340	
3-3. D-1 Line						
310	Excavation	cum	67	30.8	2.064	
311	Smoothing face of excavated	sqm	332	1.5	498	
312	Sub-Total				2.562	
3-4. D-2 Line						
313	Excavation	cum	131	30.8	4.035	
314	Smoothing face of excavated	sqm	463	1.5	695	
315	Lining concrete	cum	0.2	1.381.9	276	
316	Metal form	sqm	2.7	113.2	306	

BILL OF QUANTITES

No. 7

Item No.	Description	Unit	Quantity	Unit Price (₱)	Price (₱)	Remarks
317	Wooden form	sqm	0.1	289.6	29	
318	Sub-Total				5.341	
3-5. F-1 Line						
319	Excavation (by Manpower)	cum	35	30.8	1.078	
320	Excavation (by Equipment)	cum	66	20.6	1.360	
321	Smoothing face of excavated	sqm	206	1.5	309	
322	Lining concrete	cum	18.0	1.381.9	24.874	
323	Reinforced concrete	cum	0.65	1.320.3	858	
324	Form	sqm	6.5	289.6	1.882	
325	Reinforced iron bar	kg	19	13.2	251	
326	Wooden form	sqm	2.1	289.6	608	
327	Metal form	"	167.4	113.2	18.750	
328	Sub-Total				50,170	
3-6. F-2 Line						
329	Excavation (by Manpower)	cum	53	30.8	1.632	
330	Excavation (by equipment)	cum	100	20.6	2.060	
331	Loading and Hauling	"	143	37.2	5.320	Q=400% to M-b
332	Smmothing face of excavated	sqm	216	1.5	324	
333	Lining concrete	cum	18.9	1.381.9	26.112	
334	Metal form	sqm	168.2	113.2	19.040	
335	Wooden form	"	1.8	289.6	521	
336	Sub-Total				55.015	

BILL OF QUANTITES

No. 8

Item No.	Description	Unit	Quantity	Unit Price (฿)	Price (฿)	Remarks
3-7. F-3 Line						
337	Excavation	cum	202	20.6	4,161	
338	Smoothing of face excavated	sqm	389	1.5	584	
339	Sub-Total				4,745	
3-8. F-4 Line						
340	Excavation	cum	202	20.6	4,161	
341	Smoothing of face excavated	sqm	454	1.5	681	
342	Sub-Total				4,842	
3-9. Miscellaneous construction works		Ls	1		3,327	3% of 3-1 to 3-?
343	Total				133,464	
					133,000	Round - Up

BILL OF QUANTITES

No. 9

Item No.	Description	Unit	Quantity	Unit Price (₱)	Price (₱)	Remarks
4..Farm Road						
4-1. A Line (0 - 209 m)						
401	Excavation	cum	44	17.8	783	
402	Embankment	"	176	84.9	14.942	with hauling
403	Pavement (Laterite)	"	64	101.6	6502	
404	Smoothing of face excavated or filled up	sqm	105	1.5	158	
405	Sub-Total				22,385	
4-2. B Line (0 - 492 m)						
406	Embankment	cum	178	84.9	15.112	with hauling
407	Pavement (Laterite)	"	363	101.6	36.881	
408	Smoothing of face excavated or filled up	sqm	242	1.5	363	
409	Sub-Total				52.356	
4-3. C Line (0 - 492 m)						
410	Excavation	cum	48	17.8	854	
411	Embankment	"	77	14.1	1.086	
412	Embankment	"	314	84.9	26.659	with hauling
413	Pavement (Laterite)	"	145	101.6	14.732	
414	Smoothing of face excavated or filled up	sqm	411	1.5	617	
415	Sub-Total				43.948	

BILL OF QUANTITES

No. 10

Item No.	Description	Unit	Quantity	Unit Price (฿)	Price (฿)	Remarks
4-4. D Line (ℓ=493 m)						
416	Excavation	cum	48	17.8	854	
417	Embankment	cum	228	14.1	3.215	
418	Embankment	cum	501	84.9	42.535	with hauling
419	Pavement (Laterite)	cum	145	101.6	14.732	
420	Smoothing of face excavated or filled up	sqm	411	1.5	617	
421	Sub-Total				61.953	
4-5. E Line (ℓ=209 m)						
422	Excavation	cum	21	17.8	374	
423	Embankment	cum	41	14.1	578	
424	Embankment	cum	160	84.9	13.584	with hauling
425	Pavement (Laterite)	cum	64	101.6	6.502	
426	Smoothing of face excavated or filled up	sqm	193	1.5	290	
427	Sub-Total				21.328	
4-6. F Line (ℓ=209 m)						
428	Pavement (Laterite)	cum	161	101.6	16.358	
429	Smoothing of face excavated or filled up	sqm	118	1.5	177	
430	Sub-Total				16.535	
4-7. Access Road (ℓ=275 m)						
431	Excavation	cum	69	17.8	1.228	
432	Embankment	cum	28	14.1	295	
433	Embankment	cum	285	84.9	24.197	with hauling

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BILL OF QUANTITES

No. 11

Item No.	Description	Unit	Quantity	Unit Price (฿)	Price (฿)	Remarks
434	Pavement	cum	83	101.6	8,433	
435	Smoothing of face excavated of filled up	sqm	392	1.5	588	
436	Sub-Total				34,841	
4-8.	Miscellaneous construction works	Ls	1		12,667	5% of 4-1 to 4-8
437	Total				266,013	
					266,000	Round off

157

BILL OF QUANTITES

No. 12

Item No.	Description	Unit	Quantity	Unit Price (₹)	Price (₹)	Remarks
	5. Construction of Pumping System					
	5-1. Construction of Pumping System					
501	Drilling well	Ls	1		175.000	include installation of casting
502	Base of pump	"	1		10,000	
503	Set-up pump and acceseries	"	1		10.000	
504	House	"	1		20.000	
505	Sub-Total				215.000	
	5-2. Miscellaneous construction works	Ls	1		21.500	10% of 5-1
506	Total				236.500	
					236.000	Round Off
	6. Set-up of Water Supply Pipe					
	6-1. Set-up of water supply pipe					
601	Pipe setting	m	350	24.2	8.470	ϕ=100 m/m
602	"	"	244	24.2	5.904	ϕ= ~~75~~ 50 m/m
603	Plain concrete	m^3	0.2	1.225	245	
604	RC pipe	m	2.0	450	900	ϕ= 300 m/m
605	Sub-Total					
	6-2. Miscellaneous construction works	Ls	1		1.35-	10% of 6-1
606	Total				17.071	
					17.000	Round Off

52

BILL OF QUANTITES

No. 13

Item No.	Description	Unit	Quantity	Unit Price (₱)	Price (₱)	Remarks
7. Appurtenant Structures						
7-1. Intake						
701	Excavation	cum	2	30.8	62	
702	Back fill	cum	1	21.5	22	
703	Reinforced concrete	cum	0.3	1.320.3	396	
704	Plain concrete	cum	0.1	1.226.9	123	
705	Form	sqm	4.3	289.6	1.245	
706	Reinforced iron bar	kg	11	13.2	145	
707	Sub-Total				1.993	
7-2. Culvert in field area						
708	Excavation	cum	102	30.8	3.142	
709	Back fill	cum	54	21.5	1.161	
710	Reinforced concrete	cum	29.7	1.320.3	39.213	
711	Plain concrete	cum	3.2	1.226.9	3.926	
712	Form	sqm	204	289.6	59.078	
713	Reinforced iron bar	kg	845	13.2	11.154	
714	RC pipe	m	9.6	450	4.320	(φ200, φ350)
715	Lining concrete	cum	1.2	1.381.9	1.658	
716	Sub-Total				123.652	
7-3. Turnout						
717	Plain concrete	cum	0.1	1.320.3	132	
718	Form	sqm	0.8	289.6	232	
719	Sub-Total				364	

BILL OF QUANTITES

No. 14

Item No.	Description	Unit	Quantity	Unit Price (₱)	Price (₱)	Remarks
7-4. Access Road						
	(Irrigation Canal)					
720	Back fill	cum	13	21.5	280	
721	Reinforced concrete	cum	5.4	1,320.3	7,130	
722	Plain concrete	cum	2.2	1,226.9	2,699	
723	Form	sqm	30.7	289.6	8,891	
724	Reinforced iron bar	kg	256	13.2	3,379	
725	Sub-Total				22,379	
	(Drainage Canal)					
726	Back fill	cum	14	21.5	301	
727	Reinforced concrete	cum	5.4	1,320.3	7,130	
728	Form	sqm	30.7	289.6	8,891	
729	Feinforced iron bar	kg	256	13.2	3,379	
730	PC pipe	m	48	1,400	67,200	4" x 12 pcs.
731	Sub-Total				86,901	
7-5. Gate						
732	Plain concrete	cum	0.1	1,320.3	132	
733	Form	sqm	0.33	289.6	96	
734	Stop log	cum	0.1	6,040	60	
735	Sub-Total				288	
7-6. Culvert at end point of Drainage Canal						
736	Excavation	cum	41	30.2	1,238	
737	Back fill	cum	16	21.5	344	
738	Reinforced concrete	cum	13	1,320.3	17,164	
739	Plain concrete	cum	1.0	1,226.9	1,227	
740	Form	sqm	19.2	289.6	5,560	

BILL OF QUANTITES

No. 15

Item No.	Description	Unit	Quantity	Unit Price (฿)	Price (฿)	Remarks
741	Reinforced iron bar	kg	215	13.2	2.838	
742	RC pipe	m	16	1.200	19.200	
743	Sub-Total				47.596	
7-7.	Miscellaneous construction works	Ls	1		14.159	5% of 7-1 to 7-6
744	Total				311.491	
					311.000	Round off.

55-1

LIST OF UNIT COST

No.	ITEM	UNIT	UNIT COST (฿)	REMARKS
1	Excavation by Manpower	m^3		Normal soil
2	Excavation by Bull Dozer(11 ton)	m^3		"
3	Excavation by Back-Hoe Shovel(0.35m^3)	m^3		"
4	Compacting by Manpower	m^3		
5	" Compactor	m^3		
6	" Vibration Roller	m^3		
7	Reinforced Concrete	m^3		
8	Lining Concrete	m^3		
9	Plain Concrete	m^3		
10	Mortal	m^3		
11	Wooden Form of Concrete	m^2		
12	Metal Form of Concrete	m^2		
13	Processing and Assembling of Reinforced Iron Bar	kg		
14	Loading by Tractor Shovel (1.2 m^3)	m^3		
15	Hauling by Dump Truck (8 ton)	m^3		L=250m
16	"	m^3		L=400m
17	"	m^3		L=1,000m
18	"	m^3		L=200m
19	Spreading by Bull Dozer (11 ton)	m^3		
20	Smoothing of Face Excavated or Filled up	m^2		
21	Pipe Setting	m		

指名業者一覧表

会社名	住所	資本金 ×1000$	設立年	代表者名	技術者数	主な業務経歴
Thai Japan Construction Co., Ltd.	Chongkolnee Bldg. 4F. 56 Surawongse Rd. BKK	5.000	1963	Isuzu Hayashi	113	Section A. BKK-Nakorn Pathom Highway Highway, Damnoensduak Phisanulok Irrigation Project Highway, Kasetsart-kaerai
Choke Praphan Construction Co., Ltd	47/2 Viparavadee Rungsit Road. M. Bangkhen, BKK	5.000	1969	Praphan Songsombt	20	K.U. Kamphaengsaen 1-st " 2nd Thai Japanese Association school Bridge stone Factory
Thai Takenaka International Ltd.	Boonmitr Bldg. 5F 138 Silom Road. BKK	10.000	1974	Boonchita Katerainark	50	The King Mongkut's Institute of Technology Kasetsart University Central Laboratory. Somitivej Hospital Japan Trade Center
Economic Construction Co., Ltd	7 Sukhumvit 13. BKK	10.000	1976	Hong Tat Chu	29	Pump station, Driveways & Drainage Express way (P.C. beam) Tennis court, Driveway & Wall T.A.G. Tank No.3 Factory
Thai Obayashi Corporation Ltd.	Thaniya Bldg. 3F 62 Silom Road. BKK	20.000	1974	Yahiro Matsui	50	Drainage for Flood, National Thai Co.Ltd. Stock yard extention. Thai Honda Kodak, Office construction Yanmar Thailand Co. Main Factory

List of Bidders

for

Construction of Model Infrastructure

on

Agricultural Extension & Agricultural Mechanization Project

in

Kasetsart University, Kamphaengsaen Campus

Date: 10th January, 1984

Name of Bidder	Name of Attendant (Block Letter)	Status	Signature
THAI-OHBAYASHI	TAKANASHI NAKAMURA	DIRECTOR. GENERAL MANAGER	
THAI JAPAN CONST. CO. LTD	T. WATANAGE	ASSIS. GENERAL MANAGER	
THAI TAKENAKA INTER. LTD.	K. YANAGISAWA PAISOON.	PROJECT MANAGER. MANAGER (ESTMATE)	
CHOKEPRAPHAN LIMITED PARTNERSHIP	PRAPHAN SONGSOMBAT	MANEGER.	
ECONOMIC construc tion consult.	Hongtatchu	manger	

บริษัท ไทยทาเคนาคา สากลก่อสร้าง จำกัด
THAI TAKENAKA INTERNATIONAL LTD.
SOONMITR BLDG., 5FL.
138 SILOM ROAD, BANGKOK.
TEL : 233-3246, 3037 234-0072, 4501, 5314, 6718

January 18, 1984

Mr. Akira Kasai
The Resident Representative
Japan International Cooperation Agency, Bangkok Office
c/o Embassy of Japan
1674, New Petchburi Road, Bangkok

Dear Sirs,

Subject: Tender for Construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project

We, Thai Takenaka International Ltd., have a great pleasure to participate in the tender for Construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project. We would like to submit our estimate and believe that our offer is the most reasonable.

We also enclose the proposal here with. If you have any question after considering our estimate, please contact us at your earliest convenience. We assure you that we will be very pleased to supply you all the details.

We hope that you will give us an opportunity to participate in this project, and we wish you the success of this project above.

Yours sincerely,

THAI TAKENAKA INTERNATIONAL LTD.

.....
Taketsugu Nunose
Managing Director

PROPOSAL

To: Mr. Akira KASAI
The Resident Representative
Japan International Cooperation Agency, Bangkok Office
c/o Embassy of Japan
1674, New Petchburi Road, Bangkok

P-01 BILL OF QUANTITIES AND BID PRICES

The undersigned Bidder having carefully examined in their entirely the Contract Documents for the Construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project, hereby offers and proposes to perform all of the construction and services, to furnish all equipments, materials, supplies, labor and other items described in the Contract Documents, all for the unit or lump sum prices stated in words and figures in the following Quantities:

For Thai Takenaka International Ltd

(Name in Print & Signature)
Taketsugu Munose
Manaing Director

- Bill of Quantities to be attached herein -

P-02 GUARANTEE OF COMPLETION

The undersigned Bidder guarantee to effect the commencement, prosecution and completion of the Contract Works.

P-03 BID SECURITY

I hereby certify that all statements herein are made on behalf of (name of company) Thai Takenaka International Ltd.
Dated this Wednesday day of January 18, 1984.

For Thai Takenaka International Ltd

Taketsugu Nunose
Managing Director
(Name in Print and Signature)

Title Thai Takenaka International Ltd.

Firm's Address 138 Boonmitr Building
Silom Road, Bangkok, Thailand

WITNESS

CONSTRUCTION COST

		COST	
A.	Direct		
1.	Land shape adjustment and land levelling	672,217	₱
2.	Irrigation canals	238,303	₱
3.	Drainage canals	175,185	₱
4.	Farm roads	374,576	₱
5.	Construction of pumping system	240,900	₱
6.	Set-up of water supply pipe	29,775	₱
7.	Appurtenant structures	243,946	₱
8.	Common temporary work	180,000	₱
	Sub Total	2,154,902	₱
B.	Indirect		
1.	Overhead	86,000	₱
2.	Profit	170,000	₱
3.	Tax	82,275	₱
	Sub-Total	338,275	₱
	Total	2,493,177	₱
	Round off	(-) 3,177	₱
	Construction Cost	2,490,000	₱

Bill of Quantity
of
Agricultural Extension
and
Agricultural Mechanization Project
In
Kasetsart University

OHBAYASHI CORP., LT

18 January 1984

PROPOSAL

To: Mr. Akira KASAI
The Resident Representative
Japan International Cooperation Agency, Bangkok Office
c/o Embassy of Japan
1674, New Petchburi Road, Bangkok

P-01 BILL OF QUANTITIES AND BID PRICES

The undersigned Bidder having carefully examined in their entirely the Contract Documents for the Construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project, hereby offers and proposes to perform all of the construction and services, to furnish all equipments, materials, supplies, labor and other items described in the Contract Documents, all for the unit or lump sum prices stated in words and figures in the following Quantities:

THAI OHBAYASHI CORP. LTD.

PRESIDENT IEHIRO MATSUI

- Bill of Quantities to be attached herein -

P-02 GUARANTEE OF COMPLETION

The undersigned Bidder guarantee to effect the commencement, prosecution and completion of the Contract Works.

P-03 BID SECURITY

I hereby certify that all statements herein are made on behalf of THAI OHBAYASHI CORP. LTD.;
Dated this 18 day of January 1984.

(IEHIRO MATSUI)

I. Matsui

Title President

Firm's Address Thoniya Bldg. 3rd Floor
62 Silom Rd., Bangkok, Thailand.

WITNESS

(Shigeo Tokonoshi)

CONSTRUCTION COST

		COST
A.	Direct	
1.	Land shape adjustment and land levelling	818,399
2.	Irrigation canals	281,300
3.	Drainage canals	214,903
4.	Farm roads	392,883
5.	Construction of pumping system	302,100
6.	Set-up of water supply pipe	26,480
7.	Appurtenant structures	289,744
8.	Common temporary work	185,000
	Sub Total	2,510,809
B.	Indirect	
1.	Overhead	95,200
2.	Profit	185,800
3.	Tax	95,274
	Sub-Total	376,274
	Total	2,887,083
	Round off	(-) 7,083
	Construction Cost	2,880,000

บริษัท โชคประพันธ์ก่อสร้าง จำกัด
CHOKE PRA PHAN CONSTRUCTION CO., LTD.
47/2 ถนนเจริญกาวตีรังสิต บางเขน กทม.10900 โทร.579-0209, 579-0063

January 18, 1984.

Mr. Akira Kasai
The Resident Representative
Japan International Cooperation Agency, Bangkok Office
c/o Embassy of Japan
1674, New Petchburi Road, Bangkok

Dear Sirs,

Subject: Tender for Construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project

We, CHOKE PRAPHAN CONSTRUCTION CO., LTD., have a great pleasure to participate in the tender for Construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project. We would like to submit our estimate and believe that our offer is the most reasonable.

We also enclose the proposal here with. If you have any question after considering our estimate, please contact us at your earliest convenience. We assure you that we will be very pleased to supply you all the details.

We hope that you will give us an opportunity to participate in this project, and we wish you the success of this project above.

Sincerely Yours,

CHOKE PRAPHAN CONSTRUCTION CO., LTD.

บ. โชคประพันธ์ก่อสร้าง
CHOKE PRA PHAN
CONSTRUCTION CO.

Praphan Songsombat.

Managing Director

PROPOSAL

To: Mr. Akira KASAI
The Resident Representative
Japan International Cooperation Agency, Bangkok Office
c/o Embassy of Japan
1674, New Petchburi Road, Bangkok

P-01 BILL OF QUANTITIES AND BID PRICES

The undersigned Bidder having carefully examined in their entirely the Contract Documents for the Construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project, hereby offers and proposes to perform all of the construction and services, to furnish all equipments, materials, supplies, labor and other items described in the Contract Documents, all for the unit or lump sum prices stated in words and figures in the following Quantities:

(Name in Print & Signature)
PRAPHAN SONG-SOMBAT
MANAGER

- Bill of Quantities to be attached herein -

P-02 GUARANTEE OF COMPLETION

The undersigned Bidder guarantee to effect the commencement, prosecution and completion of the Contract Works.

P-03 BID SECURITY

I hereby certify that all statements herein are made on behalf of (name of company) CHOKE PRA PHAN LTD.,PART ;
Dated this Wednesday day of January 18, 1984.

PRAPHAN SONG-SOMBAT
MANAGER

(Name in Print and Signature)

Title CHOKE PRA PHAN LTD.,PART.

Firm's Address 47/2 Vipavadee-Rungsit
Km.14, Bangkok

WITNESS

CONSTRUCTION COST

		COST
A.	**Direct**	
1.	Land shape adjustment and land levelling	844,542
2.	Irrigation canals	267,753
3.	Drainage canals	209,576
4.	Farm roads	409,798
5.	Construction of pumping system	310,000
6.	Set-up of water supply pipe	23,400
7.	Appurtenant structures	295,672
8.	Common temporary work	205,000
	Sub Total	2,565,741
B.	**Indirect**	
1.	Overhead	50,000
2.	Profit	220,000
3.	Tax	96,773
	Sub-Total	366,773
	Total	2,932,514
	Round off	(-) 514
	Construction Cost	2,932,000

JAPAN CONSTRUCTION CO., LTD.

4th Floor, Chongkolnee Bldg.
56 Surawongse, Road, Bangkok, Thailand.
Tel. 2336115, 2316679.

18th January, 1984

Mr. Akira Kasai
The Resident Representative
Japan International Cooperation Agency
Bangkok Office
C/O Embassy of Japan
1674, New Petchburi Road, Bangkok

Our Ref. No. T-005/1984

Re : Tendor for CONSTRUCTION OF MODEL INFRASTRUCTURE ON AGRICULTURAL EXTENSION AND AGRICULTURAL MECHANIZATION PROJECT

Dear Sir:

Attached herewith we are pleased to submit our proposal for the CONSTRUCTION OF MODEL INFRASTRUCTURE ON AGRICULTURAL EXTENSION AND AGRICULTURAL MECHANIZATION PROJECT.

We have also enclosed a set of specifications and drawings for return.

Looking forward to hear from you soon.

Very truly yours,

THAI JAPAN CONSTRUCTION CO., LTD.

Isuzu Hayashi
Managing Director

III/III/kc.

Encl.

PROPOSAL

To: Mr. Akira KASAI
The Resident Representative
Japan International Cooperation Agency, Bangkok Office
C/O Embassy of Japan
1674, New Petchburi Road, Bangkok

P-01 BILL OF QUANTITIES AND BID PRICES

The undersigned Bidder having carefully examined in their entirely the Contract Documents for the Construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project, hereby offers and proposes to perform all of the construction and services, to furnish all equipments, materials, supplies, labor and other items described in the Contract Documents, all for the unit or lump sum prices stated in words and figures in the following Quantities:

I. Hayashi

Isuzu Hayashi
Managing Director

- Bill of Quantities to be attached herein

P-02 GUARANTEE OF COMPLETION

The undersigned Bidder guarantee to effect the commencement, prosecution and completion of the Contract Works.

P-03 BID SECURITY

I hereby certify that all statements herein are made on behalf of Thai Japan Construction Co., Ltd. : Dated this 18th day of January 1984.

Isuzu Hayashi
Managing Director
Thai Japan Construction Co., Ltd.
4th Floor, Chongkolnee Building
56 Surawongse Road, Bangkok 10500

WITNESS

CONSTRUCTION COST

		COST
A.	Direct	
1.	Land shape adjustment and land levelling	770,538
2.	Irrigation canals	249,325
3.	Drainage canals	196,160
4.	Farm roads	396,025
5.	Construction of pumping system	263,425
6.	Set-up of water supply pipe	25,994
7.	Appurtenant structures	272,089
8.	Common temporary work	150,000
	Sub Total	2,323,556
B.	Indirect	
1.	Overhead	96,900
2.	Profit	195,000
3.	Tax	89,255
	Sub-Total	381,155
	Total	2,704,711
	Round off	(-) 4,711
	Construction Cost	2,700,000

บริษัท เศรษฐกาจก่อสร้าง จำกัด
สุขุมวิท 13 (ซอยแสงจันทร์) กระโขนง กรุงเทพฯ 11
โทร. 2528643

ECONOMIC CONSTRUCTION CO.,
7 SUKHUMVIT 13, BANGKOK-11
THAILAND
TEL. 2528643

January 19, 1984

Mr. Akira Kasai
The Resident Representative
Japan International Cooperation Agency, Bangkok Office
c/o Embassy of Japan
1674, New Petchburi Road, Bangkok

Dear Sirs,

Subject: Tender for Construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project.

We, Economic Construction Co., Ltd., have a great pleasure to participate in the tender for Construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project. We would like to submit our estimate and believe that our offer is the most reasonable.

We also enclose the proposal here with. If you have any question after considering our estimate, please contact us at your earliest convenience. We assure you that we will be very pleased to supply you all the details.

We hope that you will give us an opportunity to participate in this proje and we wish you the success of this project above.

Youre sincerely,

(Mr. HONG TAT CHU)
Managing Director

PROPOSAL

To: Mr. Akira KASAI
The Resident Representative
Japan International Cooperation Agency, Bangkok Office
c/o Embassy of Japan
1674, New Petchburi Road, Bangkok

P-01 BILL OF QUANTITIES AND BID PRICES

The undersigned Bidder having carefully examined in their entirely the Contract Documents for the Construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project, hereby offers and proposes to perform all of the construction and services, to furnish all equipments, materials, supplies, labor and other items described in the Contract Documents, all for the unit or lump sum prices stated in words and figures in the following Quantities:

(Name in Print & Signature)
HONG-TAT CHU
GENERAL MANAGER

- Bill of Quantities to be attached herein -

P-02 GUARANTEE OF COMPLETION

The undersigned Bidder guarantee to effect the commencement, prosecution and completion of the Contract Works.

P-03 BID SECURITY

I hereby certify that all statements herein are made on behalf of (name of company) ECONOMIC CONSTRUCTION CO., LTD.
Dated this Wednesday day of January 1984.

HONG-TAT CHU
GENERAL MANAGER
(Name in Print and Signature)

Title ECONOMIC CONSTRUCTION CO., LTD.

Firm's Address 7 Sukumvit 13
Bangkok, Thailand

WITNESS

CONSTRUCTION COST

		COST
A.	**Direct**	
1.	Land shape adjustment and land levelling	772,144
2.	Irrigation canals	227,526
3.	Drainage canals	174,408
4.	Farm roads	374,780
5.	Construction of pumping system	229,500
6.	Set-up of water supply pipe	27,220
7.	Appurtenant structures	250,070
8.	Common temporary work	195,000
	Sub Total	2,250,648
B.	**Indirect**	
1.	Overhead	70,000
2.	Profit	150,000
3.	Tax	84,314
	Sub-Total	304,314
	Total	2,554,968
	Round off	(-) 4,962
	Construction Cost	2,550,000

CONSTRUCTION COST

BIDDERS

Date: 18th January 1984

	COST (Estimated Contract Price by JICA)		CHOKE PRAPAN CONSTRUCTION CO., LTD.	THAI JAPAN CONSTRUCTION CO., LTD.	THAI OHBAYASHI CORP. LTD.	THAI TAKENAGA INTERNATIONAL CO., LTD.	ECONOMIC CONSTRUCTION CO., LTD.
A. Direct							
1. Land shape adjustment and land levelling	596,000	¥	844,542	770,538	818,399	672,217	772,144
2. Irrigation canals	191,000	¥	267,753	249,325	281,300	238,303	227,526
3. Drainage canals	133,000	¥	209,576	196,160	214,903	175,185	174,408
4. Farm roads	266,000	¥	409,798	396,025	392,883	374,576	374,780
5. Construction of pumping system	236,000	¥	310,000	263,425	302,100	240,900	229,500
6. Set-up of water supply pipe	17,000	¥	23,400	25,994	26,480	29,775	27,220
7. Appurtenant structures	311,000	¥	295,672	272,089	289,744	243,946	250,070
8. Common Temporary Works	170,000	¥	205,000	150,000	185,000	180,000	195,000
Sub-Total	1,920,000	¥	2,565,741	2,323,556	2,510,809	2,154,902	2,250,648
B. Indirect							
1. Overhead	115,000	¥	50,000	96,900	95,200	86,000	70,000
2. Profit	183,000	¥	220,000	195,000	185,800	170,000	150,000
3. Tax	88,000	¥	96,773	89,255	95,274	82,275	84,314
Sub-Total	386,000	¥	366,773	381,155	376,274	338,275	304,314
Total	2,306,000	¥	2,932,514	2,704,711	2,887,083	2,493,177	2,554,968
Round off	(-) 6,000	¥	(-) 514	(-) 4,711	(-) 7,083	(-) 3,177	(-) 4,968
Construction Cost	2,300,000	¥	2,932,000	2,700,000	2,880,000	2,490,000	2,550,000

CONTRACT

FOR

CONSTRUCTION OF MODEL INFRASTRUCTURE
ON AGRICULTURAL EXTENSION AND AGRICULTURAL
MECHANIZATION PROJECT

IN THE KASETSART UNIVERSITY

BANGKOK OFFICE
JAPAN INTERNATIONAL COOPERATION AGENCY

CONTRACT

For Construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project in the Kasetsart University

This Contract is executed on the 26th day of January 1984 at the JICA Bangkok Office between Thai Takenaka International Ltd.

Japan International Cooperation Agency, Bangkok Office by Mr. Akira Kasai Title Director as its authorized representative of the JICA Bangkok Office, hereinafter called "the JICA" of the one part, and Thai Takenaka International Ltd. whose office is situated at Silom Road Tambon Suriwong Amphoe Bangrak Changwat Bangkok Tel. 234-0072 Represented by Mr. Taketsugu Nunose Nationality Japanese Title Managing Director hereinafter called "the Contractor", of the other part.

Both parties mutually agree under the terms of this Contract as follows:-

Article 1 Purpose of agreement and Contract Price

The JICA agrees to employ the Contractor and the Contractor agrees to perform the Works for the construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project located at Kamphaengsaen Campus of Kasetsart University, Nakorn Pathom, 7310. For the total amount of 2,300,000.- Baht. (Two Million and Three Hundred Thousand Baht), hereinafter called "Contract Price".

The following documents shall form integral part of this Contract:-

Terms and conditions of this contract

Pledge agreement

Technical specification

Bill of Quantities

Drawings

Article 2 Performance Bond

As a security for the faithful performance of the Works under this Contract, the Contractor has on the execution of this Contract deposited a performance bond with the JICA in lieu thereof a Bank Guarantee issued by the The Bank of Tokyo, Ltd. bearing the number BKG 165-84/172 and dated January 24,1984 in the amount of 115,000.- Baht (One Hundred Fifteen Thousand Baht) which represents five (5) percent of the Contract Price, the name of the issuing bank and the form of the bank guarantee are to be approved by the JICA.

The JICA will return the Performance Bond in cash or the Bank Guarantee to the Contractor as the case may be at the end of the twelve (12) months after final acceptance of the Works by the JICA as stipulated in Article 15 of this Contract, provided that the completed Works shall not show any defect or damage caused through the fault of the Contractor, or through the fault of any new Contractor in the case of termination of Contract by the JICA under Article 4.

Should the Contractor be in default, the JICA shall have the right to demand payment from all or any part of the Performance Bond. In addition, the Contractor shall remain liable for the full loss sustained by the JICA.

Article 3 Payment

The JICA agrees to effect payments for the Works to the Contractor in the following manner:-

a. Advance Payment, to be effected upon the bringing of equipment and materials required for the Works and properly stored at the job site by the Contractor and of value estimated by the Inspection Committee.

Six hundred ninety thousand Baht (690,000 Baht) which corresponds to Thirty (30) percent of the Contract Price shall be paid upon signing of this Contract.

b. Interim Payment, to be effected according to the progress of the Works satisfactorily executed by the Contractor and accepted by the Inspection Committee.

Nine hundred twenty thousand Baht (920,000 Baht) which corresponds to Forty (40) percent of the contract Price shall be requested for payment at the end of April , 1984.

c. Final Payment, to be effected upon the satisfactory completion of the Works by the Contractor and accepted by the Inspection Committee.

The remainder of Six hundred ninety thousand Baht (690,000 Baht) which corresponds to Thirty (30) percent of the Contract Price, shall be paid after the Final Certificate by the JICA for payment to the Contractor.

Payment under (b) and (c) shall be effected within the (10) days after the respective acceptance of the Works by the Inspection Committee.

Taxes payable by the Contractor, if any, shall be deducted at source by the JICA on each payment.

It is expressly understood that payments by the JICA do not mean acceptance responsibilities under this Contract.

Article 4 Completion Time

The Contractor agrees to commence the Works at the site within ten (10) days from the date of signing of this Contract (Commencement date) and the Contractor agrees to satisfactorily complete the Works within 130 days (Completion time) from the date hereof which will become due on 15th June, 1984 (Completion date).

If the Contractor fails to commence the Works by the above commencement date, or should in the course of the construction any event occur which may reasonably cause the JICA to believe that the Contractor will not be able to complete the Works on the completion date, or should the Contractor fail to complete the Works by the completion date, or should the Contractor fail to meet any of the Contract requirements, the JICA shall have the right to terminate this Contract by giving written notice to the Contractor.

However, in case that the Contractor fails to complete the Works by the completion date, or to meet any of the Contract requirements, if the Inspection Committee thinks that the Contractor has the ability for completion of the Works within reasonably extended period, the Contractor may be permitted by the JICA to continue the Works beyond the completion date but within the extended time.

Article 5 Penalty

In case that the Contractor is in default as mentioned in Article 4, the Contractor agrees to be responsible to the JICA as follows:-

5.1 In case of the termination by the default of commencement for the Works, the Contractor shall pay a penalty of 20,000.- Baht (Twenty Thousand Baht) per day counting from the commencement date until the new Contract is completely executed with a new Contractor for this Works, the period of which is included the time spent for finding the new Contractor and executing the new Contract etc.

5.2 In case the JICA thinks that the Contractor will not be able to complete the Works within the completion time and thereby terminates this Contract, the Contractor shall pay a penalty of 20,000.- Baht (Twenty Thousand Baht) per day counting the number of days in the same manner as prescribed in 5.1 above. However, the JICA may reduce such number of days according to the ratio between the completed Works and the total Works as may be decided by the Inspection Committee.

5.3 In case the Contractor fails to complete the Works by the completion date or to meet any Contract requirement, the Contractor shall pay a penalty of 20,000.- Baht (Twenty Thousand Baht) per day counting from the date following the completion date until the Works satisfactorily completed and accepted by the Inspection Committee.

Article 6 Compensation

If the JICA sustains any losses as direct or indirect damages caused by the Contractor's failure, the Contractor shall compensate the JICA for such losses. The parties agree that time is essential for the completion of the Works.

Article 7 The JICA's right for default

The JICA has the sole and absolute right to decide whether to terminate the Contract, to impose only the penalty on the Contractor or to claim the compensation for the damage as stated in Article 5 or Article 6. The money due to the JICA exercising its right under this article shall be retained and deducted from any money due to the Contractor but yet unpaid, including from the performance bond. If the total amount of the loss is larger than the money above-mentioned, the Contractor agrees that the JICA has the right to retain the construction equipment, materials and supplies etc. and demand payment of the balance from such equipment etc. or proceeds of sale thereof.

Article 8 Contractor's responsibility on termination of this Contract

After the Contract has been terminated in accordance with the foregoing Article 4, the JICA shall have the right to employ another Contractor (hereinafter called the "New Contractor") to carry on the remaining parts of the Works, and the payment for the Contractor that fail to complete the work shall be made out of the necessary Contract price for the remaining Works. Should the remaining amount after payment of the advance and interim payment from the Contract Price, be insufficient to effect payment to the new Contractor, the difference between such remaining amount and actual cost estimated by the JICA for the satisfactory completion Works carried out by the new Contractor, shall be deemed as direct loss sustained by the JICA, and the Contractor shall pay such difference to the JICA within ten (10) days from the date of request by the JICA, failing which interest at the rate of eighteen (18) percent per annum shall be charged thereon.

Article 9 Inspection Committee

The Inspection Committee, authorized to act on behalf of the JICA will be appointed by the JICA and the Inspection Committee is entitled to do all things that the JICA may do so. The Inspection Committee shall control and supervise the Works all the times whether it is in the preparation or implementation of the Works and the Contractor shall promptly furnish all necessary facilities for proper inspections of the Works in accordance with the Inspection Committee's request. At any moment the Inspection Committee can request the Contractor to stop the Works, if necessary and the Contractor shall have no claim on the JICA for extension of the completion time due to such suspension of the Works under this Article.

The Inspection will not be deemed as the acceptance of the Works, and the Contractor shall not be relieved from his responsibility to meet the Contract requirements by the fact that the Inspection Committee exercise their duties. Should it be found that the Works have not been satisfactorily performed in the faithful manner, the Contractor shall correct any part of the Works indicated by the Inspection Committee within the period specified by the Inspection Committee.

Article 10 Prohibition for the equipment removal

Should the Contractor fail to complete the Works during the completion time or the Inspection Committee thinks that the Contractor will not be able to satisfactorily complete the Works, any equipment and materials brought to the site for use on the Works shall not be removed without the prior approval of the Inspection Committee in writing.

Article 11 Rectification of the defective construction

For a further period of one (1) year after satisfactory completion and final acceptance of the Works by the JICA, whether completed by the Contractor or by the new Contractor in case of termination of Contract under Article 4, any damage to the Works which is caused by the Contractor's fault, either because of defective workmanship or the use of inferior materials or any other cause, shall be made good as necessary by the Contractor to the satisfaction of the JICA at no extra cost.

In case of the termination of the Contract, the JICA may decide which part of the Works should come under the Contractor's responsibility, and requests the Contractor to make good of the damaged Works. Should the Contractor fail to do so within period specified after receipt of written request to do so from the JICA, the JICA shall have the right to employ another Contractor to carry out such work and the Contractor agrees to bear all expenses incurred.

Article 12 Discrepancies among the Contract Documents

If, prior to or during the course of the Works, any discrepancies are found in the drawings and/or the Technical Specifications etc. attached to this Contract, the Contractor shall follow the ruling given by the Inspection Committee at no additional cost to the JICA.

Article 13 Construction Method and Temporary Works

The construction method including implementation schedule and plan of the temporary works such as installation of temporary facilities, offices, warehouses, construction roads, electric wiring, etc. shall be submitted by the Contractor and approved by the

Inspection Committee at least 10 (10) days in advance of the commencement of the Works.

Should the cost of the above temporary works the estimated in the unit cost of each work items of Bill of Quantities in this Contract, and the Contractor is not entitled to claim any amount of charges for the temporary works.

Article 14 Modification of Plan

If the Inspection Committee finds it necessary to make modification of construction design and/or materials and so forth during the course of construction, the JICA has the right to order the modification of the Works to the Contractor, and such order shall be made in writing from the Inspection Committee to the Contractor.

The JICA agrees to adjust upwards or downwards the necessary expense for such modification to the Contractor, which will be estimated by unit price in the bill of quantities of this Contract in case of modification of quantities of construction works. In the case of additional works which are not quoted by unit price in the bill of quantities of this Contract, the Inspection Committee will make estimation thereof and the JICA will pay to the Contractor for such additional works accordingly. But if the Contractor does not agree to such estimation, the Contractor is then entitled to negotiate with the JICA. Also the extension of the completion time due to the modification shall be given by the JICA who shall have the sole right to decide the number of days of such extension.

Article 15 Acceptance of the Works

When the entire Works have been completed, the Contractor shall submit the invoice in written form indicating the Work

actually completed to the Inspection Committee. If there are compliance with drawings or Technical Specifications, the JICA shall accept the Works as the final acceptance of satisfactory completion Works within ten (10) days after the receipt of the written form and it shall be deemed that the final acceptance has been made on such date of the receipt of the written form.

On the other hand, should non-compliance with drawings or Technical specifications or defects be found in the Works executed by the Contractor, the Inspection Committee will have the right not to accept the Works and to order to rectification of the Works. If the required period for the rectification of the Works is beyond the completion date, the Contractor shall not be relieved from its responsibility to pay the penalty as stipulated under clause 5.3, and after the completion of rectification of the Works, then the final acceptance will be made in the same manner as described in the first paragraph of this Article.

During the course of construction, whether in the completion time or of extended time specified in the last paragraph of Article 4, the JICA has the right to accept a part of the Works already completed in the written form which shall be considered as a part of final acceptance. However, both parties shall negotiate with each other for the maintenance and usage of the accepted part of the Works, and the contractor is not entitled to request the extension of the completion time due to any interruption caused by the use of such accepted Works by Kasetsart University, the JICA, the Inspection Committee or the officers of Thai Government authorities, or any delay in repairing such accepted Works.

Article 16 Construction Engineer

The Contractor shall appoint a construction engineer at his own expense for the supervision of the Works performance, who shall be authorized to act on behalf of the Contractor, and the

instructions given to him shall be deemed as given to the Contractor. Such construction engineer shall be a well English-speaking person and accepted by the JICA, who shall stay at the job site all the time and shall not leave without obtaining the prior approval of the Inspection Committee. If the Contractor replaces the construction engineer, the Contractor shall obtain the prior approval from the Inspection Committee in writing.

Article 17 Replacement of Labour, Engineer and Foreman

The Inspection Committee may request the Contractor to remove any of the Contractor's foremen or engineers if it appears to the Inspection Committee that such foremen or engineers, are incompetent for their job or are not suitable or are not capable of handling their workmen or staff, and the Contractor shall promptly replace any such foremen or engineers. No extra cost or claim for extension of time will be allowed because of such replacement.

Article 18 Sub-Contractor

The Contractor shall not sub-contract or assign any portion of the Works under this Contract without obtaining the prior approval of the JICA who has the sole right to decide which portion of the Works may be sub-contracted or assigned to the Sub-Contractor. However, the Contractor shall be fully responsible for the Works done by the Sub-Contractor.

Article 19 Notice

All Notices required by this Contract shall be effective only at the time of receipt thereof, and only when received by the parties concerned at following address :-

The JICA	Bangkok Office, c/o Japanese Embassy
	1674 New Petchburi Road, Bangkok
The Contractor	Thai Takenaka International Ltd.
	138 Boonmitr Building 5th Floor
	Silom Road, Bangkok

All Notices required by the terms of this Contract shall be made in writing in English Language, and delivered by registered mail or hand delivery.

Article 20 Dispute

In the event of any dispute arising from the interpretation and performance of the terms of this contract, both parties agree to make the best attempt with sincerity and in good faith to negotiate and amicably settle such dispute, failing which the parties agree to refer such dispute to arbitration under Thai Commercial Arbitration Rules and Regulation, Bangkok, by 2 arbitrators, each of which is to be appointed by each party. If either party fails to appoint its arbitrator within seven (7) days or should the arbitrators fail, within fifteen (15) days after their appointment, to agree upon the decision of the dispute or not decision is reached on the appointment of an umpire, then the dispute shall be brought before the Court of Thailand for decision under the laws and procedures of the Kingdom of Thailand.

This Contract is executed in duplicate of the same tenor, one of the original copy to be kept by JICA and the other original copy to be kept by the Contractor. Both the JICA and the Contractor have set their signatures and affixed the seals thereto in the presence of the witnesses.

---------- JICA

Mr. Akira Kasai, Director, Bangkok Office,
Japan International Cooperation Agency.

---------- Contractor

Mr. Tatsugu Nunose, Managing Director
Thai Takenaka International Ltd.

---------- Witness

Mr. Fumio Kikuchi, Assistant Resident Representative
Bangkok Office, Japan International Cooperation Agency

---------- Witness

Mr. Yoshimitsu Yokawa, A Member of Inspection
Committee for the Construction

TERMS AND CONDITIONS OF THIS CONTRACT

Section 1 General Information

1.1 Objective

According to the Record of Discussion signed April 30, 1980, technical cooperation concerning Agricultural Extension and Agricultural Mechanization Project in Kasetsart University in Thailand (the Project) will be carried out.

The objective of the Works are to construct the testing field which is necessary for the Project.

1.2 Location of the site

The job site is located in Kamphaengsaen Campus, Kasetsart University, Nakorn Pathom, 7310.

1.3 Collaboration

Accordingly the objective of the technical cooperation, the University counterpart agency of the JICA is executing several experiments around the job site. Prior to or during the course of the Works, the Contractor shall make the good relation with the University for the satisfactory implementation of the Works as to secure full collaboration. Should it happen that the relation between the University and the Contractor is disturbed, the Contractor shall inform the Inspection Committee who will conciliate the both parties.

Section 2 Submission of Notices

2.1 Work schedule

The Contractor shall submit the Work schedule in following items before the commencement of the Works at the job site. If the Contractor intends to change the Work schedule, the approval from the Inspection Committee shall be obtained prior to the modification of the schedule.

1. Preparation of facilities and transportation of equipment etc. to the job site
2. Land shape adjustment and land levelling
3. Irrigation canal
4. Drainage canal
5. Farm road
6. Construction of pumping system
7. Set up of water supply pipe
8. Appertenant structures
9. Clearing away

Also the Contractor shall submit the machineries scheme including the numbers, and kind of machineries and using period of them.

2.2 Notices

The JICA and the Contractor shall submit the notices to each other, as necessary, in accordance with Article 19 in this Contract within reasonable time except that special articles are provided in this Contract and Terms and Conditions of this Contract.

Section 3 Field Test and Inspection

The field tests in accordance with the Technical specification and the demands from the Inspection Committee shall be the responsibility for the Contractor. The charges for such field test shall be included in the total amount of the construction cost, and the Contractor is not entitled to claim any amount of the field test charges.

Section 4 Modification of Plan

In case the JICA estimate the cost for the modification

in accordance with Article 14, and if there are two portions, one for the increase and the other for the decrease of the construction cost resulting from such modification, the JICA shall have the right to offset them in the payment and pay or claim the difference between the increase and decrease of the construction cost as the case may be.

Section 5 Release from the Works

After the final acceptance of the Works by the JICA, the Contractor shall remove its own temporary facilities, warehouses, construction roads, electric wiring, surplus material, debris and so forth which were provided by the Contractor within 10 (ten) days. Upon approval of the Inspection Committee for the removal of the abovementioned facilities etc., the Contractor will be released from its responsibility of the Works but remains responsible under 1 (one) year guarantee of the Works as specified in Article 11 in this Contract.

Section 6 General Obligations of the Contractor

6.1 Temporary office and residence

In case the Contractor intends to build the temporary office, residence and so forth, the Contractor shall submit the plan to the Inspection Committee for approval at least 10 (ten) days in advance of the commencement of the Works.

The Contractor is required to always keep the buildings and facilities in good condition and to make proper drainage and sanitary system. Should the Contractor build them outside of the job site, the Contractor shall arrange with the own of such land and at its own expense.

6.2 Fuel storage

In area of temporary office and residence, the fuel tank capacity shall not exceed 1,000 liters and shall be far away from the housing area.

Fuel storage and transportation shall be done with care and shall have a good system of fire prevention. If storage licence is required, the Contractor shall arrange for obtaining it.

6.3 Other facilities

All necessary facilities for the Works and the Contractor's convenience shall be provided and maintained in good condition by the Contractor.

Section 7 General Text

The Contractor shall implement the Works in accordance with the Contract Documents in broad sense such as the Contract in narrow sense, Terms and Conditions of this Contract, Technical Specification. Should the events occur that the both parties can not reach agreement on the interpretation of the above-mentioned Contract Documents in broad sense, both parties shall negotiate with sincerity and good faith for settlement of any disagreement, failing which the decision of the JICA shall prevail.

PLEDGE AGREEMENT

To Japan International Cooperation Agency, Date 26th January 1984
Bangkok Office.

We Thai Takenaka International Ltd., the Contractor hereby agree that all equipment, materials and supplies brought to the job site under this Contract made with the JICA dated on 26th January 1984, shall be pledged by us with the JICA as security for our execution of Works, and shall not be removed at any time without prior approval of the JICA in writing.

We further agree that should there by any loss or damage to pledged equipment, materials and supplies kept at the job site, the JICA shall bear no responsibility whatsoever for such loss or damage.

TECHNICAL SPECIFICATIONS

FOR

CONSTRUCTION WORK OF IMPROVEMENT PROJECT OF MODEL INFRASTRUCTURE ON AGRICULTURAL EXTENSION AND AGRICULTURAL MECHANIZATION PROJECT

AT KASETSART UNIVERSITY
KAMPHAENGSAEN CAMPUS

BANGKOK OFFICE
JAPAN INTERNATIONAL COOPERATION AGENCY

TECHNICAL SPECIFICATIONS

PART 1 SPECIAL PROVISION

1-01 The Contractor shall execise utmost care so that his construction operations will not damage any existing structure except such structures as specified to be dismantled, or will not cause the disturbances not only on the operation of the Agricultural Machinery Center but also on the cultivation land of the other project in University. Any damages on the such existing structure or facilities shall be made good by the Contractor at his expense.

1-02 If it is necessary in the prosecution of the work to interrupt or obstruct the drainage of the surface, the flow of artificial drains and the flow of irrigation canal, the Contractor shall provide for the same during the progress of the work in such a way that no damage shall result to either public or private interest. For any neglect to provide for either natural or artificial irrigation or drainage which he may interrupted, he shall be held liable for all damages which may result therefrom during the progress of the work.

1-03 The Contractor is expected to visit the location of the work and make his own estimate of the facilities needed for the work. In the successful execution of the contract, the Contractor is expected to familiarize himself with local conditions, availability of labor, transportation facilities, uncertainties of weather, and other contingencies. From investigations, made at site, it is believed that topographical conditions are approximately as shown on the drawings, but the nature of the materials and the depth of satisfactory foundations, are not guaranteed. It is expressly understood that JICA will not responsible for any deduction, interpretation, or conclusions made by the Contractor. JICA does not guarantee that other materials will not be encountered or that the proportions of the several materials will not vary from those indicated by the drawings.

1-04 Elevations referred to the datum plane are to be determined from bench marks established by JICA or the Inspection committee at the site of the work.

1-05 The Inspection Committee will establish the necessary survey monuments and bench marks at convenient points in the area covered by this contract for use of the Contractor in laying the lines and grades required for the proper conduct and execution of the work. All stakes, bench marks, etc., placed by the Inspection Committee in laying out the work shall be carefully guarded and preserved by the Contractor, and in such case stakes or marks are misplaced or rendered useless through the carelessness or negligence of the Contractor or his agents, employees or workmen, they will be replaced by the Inspection Committee at the expense of the Contractor.

1-06 The Contractor shall execute the work to the lines and grades given by the drawings and/or the Inspection Committee. The Contractor shall, at his own expense, furnish all stakes, templates, pattern, platforms and labor that may be required in setting or laying out any part of the work.

PART 2 GENERAL CONSTRUCTION FACILITIES

2-01 SOCPE

This part covers the construction and/or maintenance of access roads, setting up of Contractor's camp facilities, providing camp security and the disposition of the Contractor's various facilities at the end of the contract.

2-02 ROADS

(a) The contractor shall improve, repair and widen, if necessary, existing roads to satisfactorily meet his haulage requirements. He shall also construct all other roads within the construction area which he deems necessary in the prosecution of his work. The improving, widening and maintaining of existing roads and constructing and maintaining new roads shall be made without cost to JICA, and same shall be the responsibility of the Contractor during and up to the completion of all construction work under the contract.

2-03 CONTRACTOR'S CAMP FACILITIES

(a) If the Contractor deems necessary, he shall grade his camp site; construct his office, employees' housing, warehouses, machine and repair shops, fuel storage tanks; and provide such other facilities that the Contractor deems necessary for maintaining health, peace and order in the camp and work area.

(b) The location, construction, operation and maintenance of such camps and facilities within the areas of Kasetsart University (Kamphaengsaen Campus) shall be subject to the approval of the Inspection Committee. At least ten (10) calender days prior to the date on which the Contractor desires to begin to work on in feature of camp construction, the Contractor shall submit for the approval of the Inspection Committee drawings and specifications, in sufficient detail to permit determination of suitability of the construction in compliance with these specifications, and no camp construction of any kind shall be undertaken until such drawings and specifications have been approved by the Inspection Committee.

2-04 CAMP SECURITY

The Contractor shall provide his own security force to the extent that the deems necessary for maintaining peace and order in the camps and work areas and to safeguard materials and equipment.

2-05 DISPOSITION OF CAMP AND CONSTRUCTION FACILITIES

After the completion of the work covered by the Contract, the entire camp of the Contractor, including its water supply system, quarters, warehouses, shops and other facilities therein; and all other temporary installations at work areas shall be removed by the Contractor and the site shall be cleaned.

2-06 PAYMENT

There will be no separate payment for complying with the requirements of this part. The expenses incurred by the Contractor shall be included in the each item as indicated in the Bill of Quantity.

PART 3 CARE OF WATER DURING CONSTRUCTION

3-01 SCOPE

In accordance with specifications contained in this part, the Contractor shall care the water during construction so that construction work can be performed in areas free from water. Care of water during construction shall include provision for drainage and pumping system for dewatering the foundation areas and the construction of temporary bulkheads necessary for the protection of construction operations from encroachment by water.

3-02 DRAINAGE AND PUMPING

The Contractor shall be responsible for dewatering the foundation areas so that work may be carried on in a suitably dry condition, draining and/or pumping all water during the process of construction until its completion. The Contractor shall construct drainage ditches, holes, or culverts; furnish, operate, and maintain at his own expense all necessary pumps, to keep all work areas in amply dry condition, and prior to final acceptance of the work by the Contracting Officer, the Contractor shall remove, fill or plug all temporary drainage structures and pumping equipments at his expense.

3-03 PAYMENT

No separate payment shall be made for the care of water during construction. But the cost of furnishing, constructing, operating, maintaining, and removal of temporary drainage structures, canals, and pumping system necessary to keep construction operations free from water shall be included in the each item as indicated in the Bill of Quantity.

PART 4 OPEN EXCAVATION AND FOUNDATION PREPARATION

4-01 SCOPE

In accordance with the Specifications contained in this part, and as shown on the drawings, or otherwise directed by the Inspection Committee the Contractor shall perform all required open excavation and foundation preparation pertinent to the construction of land levelling, farm road, irrigation canal, drainage canal, and other construction work where open excavations are to be made.

4-02 OPEN EXCAVATION

(a) General

Open excavation under these Specifications consists of the removal, hauling, dumping, and satisfactory disposal of all materials from required excavations for farm road, irrigation and drainage canals and miscellaneous excavations for other structures included under this contract. Open excavation shall be performed to the lines and grades shown on the drawings or established by the Inspection Committee. The Inspection Committee may modify slopes of excavation to fit conditions encountered during construction. Such changes or modifications shall not considered by the Contractor as a basis for additional compensation over and above the unit prices bid. All necessary precautions shall be taken to preserve the ground outside the specified lines and grades in the soundest possible condition.

(b) Foundation in Loose Material

When the surfaces of excavation upon or against which concrete or embankment fill is to be placed consist of loose material, the said loose materials shall be removed or replaced with suitable materials and compacted in a manner satisfactory to the Inspection Committee. The cost of removing the loose materials shall be paid for under the pertinent bid items for open excavation. The cost for the replacement with suitable materials and the compaction of the same shall be paid for under the pertinent bid items for fill.

4-03 DISPOSITION OF EXCAVATED MATERIALS

(a) Spoil Areas

The Contractor shall submit for the approval of the Inspection Committee locations, areas, drawings and other necessary specifications of spoil area which the Contractor proposes to use for the work under this Contract, and any kind of disposition shall not be undertaken before obtaining the said approval. Excavated material not suitable for fill or otherwise not needed shall be wasted in approved spoil areas. Spoil piles shall be constructed to the stable slopes of the material being wasted. Any spoil pile exceeding two (2) meters in height shall not be performed. Spoil material shall be spread and graded so that surface drainage will not be concentrated and will not create and/or accelerate undesirable erosion in spoil areas.

4-04 DEMOLITION, REMOVAL, AND DISMANTLING

When specified in the drawing or the Inspection Committee, existing concrete structures, such as concrete masses, stones, etc., shall be demolished and disposed of accordingly.

4-05 FOUNDATION PREPARATION

(a) Fill on Earth

All horizontal and sloped earth surfaces, upon which embankment material is to be placed or other foundation surfaces whose locations are specifically indicated by the Inspection Committee, shall consist of undisturbed or compacted material and shall be clean, damp, free from standing or running water and free from organic matter; and shall be suitable as a foundation for the material to be placed upon them.

(b) Concrete

All horizontal and sloped earth surfaces upon which concrete is to be placed shall be undisturbed or of approved compaction, clean and damp, free from standing or running water, and shall be otherwise suitable as a foundation for the concrete to be placed upon them.

4-06 MEASUREMENT FOR PAYMENT

(a) Open Excavation

A survey of the areas to be excavated shall be made by the Contractor prior to the commencement of the work under this contract, and all measurements of excavation shall be based on this survey without regard to any change that may occur during the prosecution of the work. All such surveys shall be the subject to check and approval by the Inspection Committee. Volumes will be computed and shall be the amount between the original ground determined by the survey and the slopes, lines and grades shown on the drawings or established by the Inspection Committee.

(b) Foundation Preparation

No separate payment will be made for all foundation preparation specified under Paragraph 4-05, (a). The entire cost of foundation preparation for 4-05, (a), shall be included in the unit price for the pertinent item of embankment or fill in the Bill of Quantity. The cost of foundation preparation specified under Paragraph 4-05, (b), shall be paid for under the pertinent item shown in the Bill of Quantity, and the measurement shall be made by the acceptable method to the Inspection Committee.

(c) Demolition, Removal and Dismantling

Demolition, removal and dismantling work will be measured by the acceptable method to the Inspection Committee and paid for under the items shown in the Bill of Quantity.

PART 5 FILL AND BACKFILL

5-01 SCOPE

In accordance with the specifications contained in this part and as shown in the drawings or otherwise directed by the Inspection Committee the Contractor shall furnish and place the earth fill for land levelling, farm road embankment and for irrigation and drainage canal embankment; backfill for related structures. Any work of fill and backfill shall not be commenced without prior approval of the Inspection Committee. The slope of the embankment shall be finished to the disigned gradient by providing fixed rules.

5-02 BACKFILL

Backfill, as used herein, is defined as refill for structures. The materials used for backfill for structures shall be free from roots, stones of more than five (5) centimeters in diameter, and other objectionable materials and subject to the approval of the Inspection Committee. Backfill materials shall be placed in layers, each layer being not more than twenty (20) centimeters thick before compaction, thoroughly compacted by means of power tempers or by other means of approved by the Inspection Committee.

5-03 FILL

(a) Lines and Grades

The fills shall be constructed to the lines, grades and cross sections indicated on the drawings, unless otherwise directed by the Inspection Committee. The Inspection Committee may increase or decrease the slopes of the fill or make such other changes in the design as may by deemed necessary to produce a stable structure. Change in quantities of materials, resulting from prescribed changes in sections, shall not make cause for claims for increased unit prices. Generally, a tolerance of plus or minus 0.05 meter from the slope lines and

grades shown on the drawings will be allowed in the finished surfaces of the embankments except that the tolerances shall not be continuous over an area greater than twenty (20) square meters.

(b) Conduct of the Work

1. The Contractor shall maintain and protect the fills in a satisfactory condition at all times until final completion and acceptance of all work under the Contract. Any approved fill material which rendered unsuitable after being placed in the fills shall be replaced by the Contractor and no additional payment will be made there. The Contractor shall excavate and remove from the fills any material which the Inspection Committee considers objectionable and shall also dispose of such material and refill the excavated as directed, all at no additional cost to JICA. The Contractor may be required to remove at his own expense any fill material placed outside of prescribed slope lines.

2. When the excavation of suitable fill material from required excavation and approved borrow sources progresses at a faster rate than placement in the fills, such excavated materials may stockpiled at approved locations until use is authorized. No separate payment will be made for stockpiling or reloading and hauling of this material to its place in the fills and all costs in connection therewith shall be included in the applicable contract unit price for the fill materials.

5-04 MATERIALS

(a) Sources

The Contractor shall submit for the approval of the Inspection Committee locations, areas, drawings and other necessary specifications of borrow areas which the Contractor proposes to use for obtaining fill material. Materials for fills shall be secured from required excavations and from the borrow areas as approved. There is no guarantee that all the materials

in any borrow area will be suitable for use in the fills and the Contractor shall move or modify his operations to avoid unsuitable material. The Contractor shall maintain and operate sufficient excavating and hauling equipment so that an adequate amount of fill material from all sources is available as required. Operations in borrow areas shall not be on danger roads, buildings, or structures. Borrow areas shall be graded to provide drainage from all parts of the excavated areas. When operations in a borrow area have terminated, the area shall be dressed to a neat and orderly appearance, as approved by the Inspection Committee. Any additional material needed shall be obtained from sources approved by the Inspection Committee.

(b) Suitability

Materials containing brush, roots, sod or other perishable material will not be considered suitable for fills. The suitability of the materials shall be subject to the approval of the Inspection Committee.

S-05 PLACEMENT

(a) General

No fill material shall be placed on any part of the fill foundations until such areas have been inspected and approved by the Inspection Committee and until after completion of foundation preparation as specified in PART 4. The gradation and distribution of materials shall be such that the fills will be free from lenses, pockets, and streaks.

(b) Earth Fill

The fill material shall be dumped and spread in horizontal layers having an uncompacted thickness of not over 20 cm. When material is spread, chunks larger than 10 cm in size shall be broken down by approved means or removed.

5-06 COMPACTION

(a) General

After a layer of fill material has been dumped and spread, it shall be compacted by hand operated mechanical tampers or by other compaction machine approved by the Inspection Committee, to a density more than 90 percent of the maximum dry density of the material or to a density specified by the Inspection Committee.

(b) Fill on or against Culverts and Concrete Structure

No fill shall be placed on or against concrete surface before a period of fourteen days has elapsed after placing the concrete. Before passage of hauling equipment over the top of culverts or other structures will be permitted, the depth of fill over the concrete shall be sufficient to permit such passage without harmful stresses or vibrations in the structure. Fill placed around and over culverts or other structures shall be compacted by hand operated mechanical tampers or by man power to a density equal to that specified for the other earth fill.

5-07 ADDITIONAL COMPACTION

If, in the opinion of the Inspection Committee, the desired compaction of portion of the embankment is not secured, addtional compaction operation shall be made over the surface area of such designated portion until the desired compaction has been obtained, without additional cost to JICA.

5-08 QUALITY CONTROL

If it is required, tests, for moisture content and density, all necessary tests will be made by the Inspection Committee, and from these tests, corrections, adjustments, and modifications of methods, materials, and moisture contents may be made in order to secure satisfactory density of the fill materials. The Contractor shall provide necessary unskilled labor in obtaining and preserving samples.

S-09 MEASUREMENT FOR PAYMENT

(1) Fill

(a) Measurement

Measurement for payment of fill will be calculated on the number of cubic meters of material placed between the foundation lines as determined on the basis on drawings or a survey made after completion of the excavation and foundation preparation and the lines, grades and slopes shown on the drawings. No allowance will be made for foundation or embankment settlement.

(b) Payment

Payment shall constitute full compensation for all work in connection with the excavation from borrow areas including clearing, grubbing and stripping of borrow areas, hauling, stock-piling, rehandling, foundation preparation, placing, spreading, sprinkling, drying, breaking up, compacting, removal of objectionable material, and all other work required for the construction, protection and maintenance of the fills. No adjustment in payment will be made for substitution of materials and for additional compaction.

(2) Backfill

Measurement for payment of backfill shall be calculated on the number of cubic meters of materials placed among the original ground line, or designated line of backfill and the structure and the neat pay lines of excavation shown in the drawings. Payment will be made on the unit price bid per cubic meter of backfill.

PART 6 LAND CONSOLIDATION

6-01 SCOPE

The land consolidation involves such kinds of construction works as earth works, and concrete works in connection with the construction of land shape adjustment, land levelling, farm road, irrigation and drainage canals and appurtenant structure. It is considered that earth works for the land consolidation such as open excavation, foundation preparation and earth fill shall be performed by the Contractor in accordance with the Specification indicated in PART 4 and PART 5 and that concrete works for the land consolidation such as pavement and placing of concrete shall be carried out by the Contractor based on the Specification described in PART 6 and PART 7. Under the circumstances stated above, the Specifications contained in this part shall prescrive the rules and matters, for which special attention shall be taken by the Contractor from the view-point of the execution for each of the construction work on the land consolidation.

6-02 GENERAL

(a) Preparation of Construction

Prior to the commencement of construction works for the land consolidation, an attention shall be taken on interception of the excess rain water drained from the out-side area of the experimental field so that the excess rain water will not flow into the area of the experimental field and then the construction works for the land consolidation shall be executed under a dry condition that the surface water on the experimental field has almost been eliminated from the ground.

(b) Procedure of Contruction Work

The construction works for the land consolidation should commence foudamentally from the work of land levelling including land shape adjustment firstly and continue in due course

with the work of farm road, drainage canal and irrigation canal.

6-03 LAND SHAPE ADJUSTMENT AND LAND LEVELLING

(a) Land Levelling

The construction of land levelling including land shape adjustment shall be prosecuted by taking the following procedure, as a standard type of the construction for land levelling;

Cut and earth fill - Land shape adjustment - Land Levelling

(b) Elimination of Pebbles, Stumps and Others

Gravels, pebbles, stumps, roots and the other organic materials, those are obstructive substances for the clutivation of the land shall be disposed either by burying them into the ground up to a depth, under which the land cultivation would not be affected by them or by carrying them out to the spoil areas.

(c) Exclusion of Water Accumulated

In the case that there are water accumulated in the depression and are water stayed in the existing drainage channel, the Contractor shall be responsible for dewatering the depression as well as the existing drainage channel so that the earth fill for both the depression and the existing drainage channel may be carried out in a suitably dry condition, draining all water during the process of the construction until its completion.

(d) Cut and Earth Fill of Land

The earth materials necessary for embankment of the lower land in elevation shall be provided with those excavated from the higher land in elevation within the experimental field. For formulating the levelling, the elevation of each plot in the experimental field after a completion of the land levelling, has been decided by taking such a way as the volume of earth materials necessary for the embankment would have well-balanced, as a whole, with those excavated.

(e) Prevention for Settlement of Embankment

The special care shall be taken on the embankment works for such areas as a settlement of the embankment would be anticipated even a little after a completion of the work, in order to keep a settlement of the embankment as small as possible. The Contractor will have liable to pay attention on the embankment works for the depression as well as for the area where the height of embankment would be comparatively high.

(f) Erection of Foot Path

The foot path shall be constructed with well compaction of earth fill materials to the lines, grades and cross sections indicated on the drawings, unless otherwise directed by the Insepction Committee.

(g) Finai Arrangement of Land

The arrangement of land for each plot in the experimental field shall be finalized to the lines and grades shown in the drawings so as to not disturb the cultivation of the experimental field.

6-04 FARM ROAD

(a) The farm road shall be constructed by using earth materials graded well from fine particle to coarse particle and be completed by compaction with hand operated mechanical tampers after a layer of fill material has been dumped and spread.

(b) The surface of farm road shall be finalized by constructing middle portion of the road higher in height than each side of the road, of which the cross sectional gradient is two (2) percent.

(c) During the period of construction for farm road, the Contractor will always pay attention on drainage of rain water to prevent the surface of road from becoming muddy.

6-05 IRRIGATION AND DRAINAGE CANALS

(a) The embankment along the irrigation canal and the drainage canal shall be constructed by using earth materials not containing pervious particles such as sands and pebbles and by taking compaction of the earth materials for each lay of the embankment in order to prevent seepage through the cross section of the embankment, and shall be completed to the lines, grades and the designed shape indicated on the drawings, unless otherwise directed by the Inspection Committee.

(b) The turn-outs shall be erected at the locations shown in the drawings, unless otherwise directed by the Inspection Committee.

PART 7 CONCRETE WORKS

7-01 SCOPE

In accordance with the Specifications contained herein and as shown on the detail drawings or otherwise directed, the Contractor shall -

(a) Furnish all materials, and manufacture, transport, place, finish, protect and cure concrete;

(b) Furnish, construct, erect and dismantle forms;

(c) Construct expansion and contraction joints and furnish and place waterstops, joint fillers, and sealing compound, if required; and

(d) Prepare, clean, cut, bend and place steel reinforcement.

7-02 CEMENT

(a) General

Cement for mortar and concrete work shall be Portland Cement which conforms to the requirements of the Standard Specifications for Portland Cement (A.S.T.M. Designation C150-69).

(b) Storage

Cement shall be stored in a dry, weather tight and properly ventilated warehouse with adequate provisions for the prevention of absorption of moisture. All storage facilities shall be subject to approval and shall be such as to permit easy access for inspection and indentification. Cement which has been stored for more than one month or which are suspected to be damp shall not be used unless otherwise approved by the Inspection Committee.

7-03 FINE AGGREGATE

(a) Composition

Fine aggregate shall be natural sand not including organic matter and other foreign substances.

(b) Quality

Fine aggregate shall consist of hard, tough, durable, uncoated particles. The shape of the particles shall be generally rounded or cubical and reasonably free from flat or elongated pieces. The fine aggregate shall conform to the following specific requirements:

1. Grading - Fine aggregate shall be well graded from fine to coarse and the gradation shall conform to the following requirements as delivered to the mixers:

Sieve Designation U.S. Std. Square Mesh	Cumulative Percentage by Weight Passing
No. 4	95 - 100
No. 16	60 - 75
No.100	2 - 10

In addition to the grading limits shown above, the fineness modulus shall be in the range from 2.30 to 3.00.

(c) Storage

Fine aggregate shall be stored in such a manner as to avoid the inclusion of any foreign material in the concrete. Sufficient live storage shall be maintained at all times to permit continuous placement of concrete at the rate specified.

7-04 COARSE AGGREGATE

(a) Composition

Coarse aggregate shall consist of gravel, crushed gravel or rock, or a combination of gravel and crushed gravel or rock.

(b) Quality and Grading

1. Quality - Coarse aggregate shall consist of hard,

tough, durable, clean and uncoated particles. All foreign materials and dust shall be removed by adequate processing. The particle shape of the smallest size of crushed coarse aggregate shall be generally rounded or cubical, and the coarse aggregate shall be reasonably free from flat and elongated particles in all sizes.

2. Grading - The coarse aggregate shall be well graded from fine to coarse. The grading of the aggregate as delivered to the mixer shall be as follows:

Sieve Designation U.S. Std. Sq. Mesh	Per Cent by Wt. Passing Individual Sieves 3/4" Max.
1"	100
3/4"	90 - 100
3/8"	20 - 55

3. Size - Unless otherwise directed, the maximum sizes of coarse aggregate to be used in the various parts of the work shall be 3/4 inch.

4. Storage - Storage of coarse aggregates shall be as that specified in Paragraph 7-03 (c) for fine aggregates.

7-05 AGGREGATE SAMPLES

Samples of the aggregate shall be furnished at a point designated by the Inspection Committee for his approval at least ten (10) days in advance of the time when the placing of concrete is expected to begin.

7-06 WATER

Water used in mixing concrete shall be fresh, clean and free from injurious amount of oil, acid, alkali, salts, or organic matter.

7-07 PROPORTIONING OF CONCRETE

(a) The Contractor shall design the mix proportion for every class of concrete placing for the approval of the Inspection Committee. The Contractor shall carry out the mix test in case being requested by the Inspection Committee. The test is to be made at the expense of the Contractor.

(b) The compressive strength of the age of 28 days shall be as follows and desirable mix proportion is also indicated.

Class	Minimum 28 days Compressive strength	Mixing proportion by volume cement: fine aggregates: coarse aggregates
A (Reinforced concrete)	210 kg/cm²	1 : 2 : 4
B (Plain concrete)	160 kg/cm²	1 : 3 : 6
C (Concrete layer)	135 kg/cm²	1 : 4 : 6

Other proportions for mixed design may be indicated by the Inspection Committee at the site of work, if it is necessary.

7-08 MIXING

(a) Equipment

Concrete shall be mixed by portable concrete mixer unless otherwise approved by the Inspection Committee.

(b) Measurement

The measurement of every ingredient of concrete shall be made in weight. Nevertheless, the measurement in volume is admitted subject to the approval of the Inspection Committee.

(c) Mixing Time and Method

The mixing time of concrete shall be more than two (2) minutes and less than five minutes. Over mixing, requiring the introduction of additional water to preserve the required consistency, will not be permitted. The mixer shall be completely emptied before receiving the materials for the succeeding batch and shall be kept clean and washed out after stopping work at the end of each shift.

On commencing work, the first batch shall contain sufficient excess of cement, sand and water to coat the inside of the drum to avoid the reduction of the required mortar content of the mix.

7-09 CONVEYING

(a) General

Concrete shall be conveying from mixer to forms. as rapidly as practicable, by methods which will prevent segragation or loss of ingredients. There shall be no vertical drop greater than 1.5 meters except where suitable equipment is provided to prevent segregation and where specifically authorized. Belt conveyors, chutes or other similar equipment in which the concrete is delivered to the structure in a thin, continuously exposed flow, will not be permitted except for very limited or isolated sections of the work. Such equipment shall be arranged to prevent objectionable segregation.

7-10 PLACING

(a) Approval

Approval of the Inspection Committee shall be obtained before starting any concrete pour.

(b) General

Concrete shall be worked into the corners and angles of the forms and around all reinforcement and embedded items without permitting the material to segregate. Not more than

three (3) cubic meters shall be deposited in one pile for compaction. Free water shall be collected in depressions away from the forms and removed by bailing prior to placement of additional concrete. All concrete placing equipment and methods shall be subject to approval.

(c) Cooling of Aggregates

The aggregate shall be cooled by wetting if it is drier than the condition known as saturated, surface dry.

(d) Concrete on Earth Foundation

All concrete shall be placed upon clean, damp surfaces free from standing or running water. Prior to placing concrete, the earth foundation shall be satisfactorily compacted in accordance with approved methods.

(e) Concrete on Other Concrete

Surface upon or against which concrete is to be placed shall be clean, free from oil, standing or running water, mud, drummy rock, objectionable coatings, debris, and loose, semi-detached or unsound fragments. To insure a firm and tight bond between fresh concrete and other concrete, concrete surfaces, where necessary, shall be chipped or roughened as directed by the Inspection Committee. All surfaces shall be wetted thoroughly to keep them in a completely moist condition before placing concrete. All approximately horizontal surfaces shall be convered with a layer of mortar of the same cement-sand ratio as used in the concrete mix before the concrete is placed.

7-11 FORMS

(a) General

Forms shall be used, wherever necessary, to confine the concrete and shape it to the required lines, or insure against contamination of the concrete. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall be maintained rigidly in

correct position. Forms shall be sufficiently tight to prevent loss of mortar from the concrete. Forms for exposed surfaces against which backfill is not to be placed shall be lined with a form grade plywood or sheet steel. Steel panel forms may also be used.

(b) Cleaning and Oiling of Forms

At the time concrete is placed in the forms, the surfaces of the forms shall be free from incrustations of mortar, grout, or other foreign material that would contaminate the concrete or interfere with the fulfillment of the Specifications' requirements relative to the finish of formed surfaces. Before concrete is placed, the surfaces of the forms shall be oiled with a commercial form oil that will effectively prevent sticking and will not stain the concrete surfaces.

(c) Removal of Forms

Forms shall be removed as soon as practicable in order to avoid delay in curing and to make possible earliest practicable repair of surface imperfections, but in no case shall they be removed before approval. Any needed repair or treatment shall be performed at once, and shall be followed immediately by the specified curing. Forms shall be removed with care so as to avoid injury to the concrete, and any concrete so damaged shall be repaired.

7-12 CURING AND PROTECTION

(a) General

All concrete shall be moist cured for a period of not less than seven (7) consecutive days by an approved method or combination of methods applicable to local conditions, except that the curing period may be reduced to three days for concrete made with high-early-strength cement. The Contractor shall have all equipment needed for adequate curing and protection of the concrete on hand and ready to install before actual concrete placement begins.

(b) Water Curing

Concrete shall be kept wet by covering with an approved, watersaturated material or by a system of perforated pipes or mechanical sprinklers or by any other approved method which will keep all surfaces continuously (not periodically) wet. Water for curing shall be generally clean and free from any element which might cause objectionable staining or discoloration of the concrete.

7-13 REPAIR OF CONCRETE

Repair of imperfections in formed concrete shall be completed within twenty four (24) hours after removal of forms at no additional cost to JICA. Fins shall be neatly removed from exposed surfaces. Concrete that is damaged or honeycombed must be removed to sound concrete and replaced with drypack, mortar, or concrete as hereinafter specified. Where large bulges and abrupt irregularities protrude, the protrusions shall be reduced by bush-hammering and grinding. Drypack filling shall be used for holes left by the removal of fasteners from the ends of form tie rods.

7-14 DRYPACK MORTAR

Drypack shall consist of a mixture (by dry volume or weight) of one (1) part cement to 2½ parts of sand conforming to Paragraph 7-03, Fine Aggregate, except that in gradation, 100% shall pass a No.16 sieve. Only enough water shall be used to produce a mortar which, when used, shall stick together on being molded into a ball by a slight pressure of the hands, and shall not extrude water but will leave the hands damp.

7-15 STEEL REINFORCEMENT

(a) General

The Contractor will furnish all steel reinforcement in accordance with the drawings and these specifications. The Contractor shall prepare, clean, cut, bend and place all

reinforcements, as shown on the detail drawings or as otherwise directed. The Contractor shall furnish all chains, supports and ties. All reinforcement shall be reasonably free from loose, flaky rust and scale, and free from oil, grease and other coating which might destroy or reduce its bond with concrete.

(b) Relationship of Reinforcement to Concrete Surfaces

The distance from the edge of the amin reinforcement to the concrete surface shall be 5 cm except such portions as shown in the drawings. The concrete covering the stirrups, spacer bars, and similar secondary reinforcement may by reduced by the diameter of such bars, unless otherwise indicated.

(c) Lapping

Lapping length at joints of the reinforcing bar shall be at least thirty times of the diameter of bar and shall be bound by steel wire.

(d) Supports

All reinforcements shall be secured in place by use of metal or concrete supports, spacers or ties. Such supports shall be of sufficient strength to maintain the reinforcement in place throughout the concreting operation. The supports shall be used in such a manner that they will not be exposed or contribute in any way to the discoloration or deterioration of the concrete.

7-16 MEASUREMENT FOR PAYMENT

(a) Concrete

1. Measurement for payment for plain or reinforced concrete, will be based on the volume of concrete in place within the lines and grades shown on the drawings.

2. No deduction will be made for rounded or bevelled edges, or space occupied by metal work, or embedded

items such as supports, spacers or ties. The cost of construction joint treatment with the attendant loss of material shall be included in the unit price bid per cubic meter of concrete.

3. Payment at the unit prices bid shall constitute full payment for all costs for concrete work. The costs of any dewatering required to maintain dry conditions during the pouring of concrete, furnishing materials, and installing and removing formwork, shall be included in the unit cost.

(b) Steel Reinforcement

Measurement for payment for furnishing, preparing bar cleaning, cutting, bending, and placing steel reinforcement by the Contractor will be based on the number of kilograms placed in accordance with the detail drawings or as otherwise directed. Payment will be made for steel in laps as shown on th drawings; where bars are welded, payment will be made as if they were lapped. Payment will not be made for steel in laps or used which are solely for the convenience of the Contractor. Payment will be made at the unit price bid for steel reinforcement. No separate payment will be made for steel reinforcement supports, and the cost thereof shall be included in the unit price bid.

PART 8 CONSTRUCTION OF DEEP WELL

8-01 SCOPE

(a) In accordance with the specification contained in this part and as shown on the detail drawings, the contractor shall furnish plant, labour, equipment, and materials, and perform all operations in connection with deep well required as a suction hole for submargible motor pump.

(b) Additional instructions in the form of additional drawings or written or verbal instructions, may be given during the progress of the work and such will not be considered to be extra work within the meaning of the specifications.

8-02 MAKING HOLE

The hole shall be made at a depth and a diameter as shown on the drawings or as directed by the Inspection Committee. The hole through overburden or unstable materials shall be cased and/or treated with cementation to prevent the caving-in of the hole. The hole shall be made by either purcussion or rotary machine and the selection of the machine shall be informed in advance by the Contractor and approved by the Inspection Committee. Confirmation of the depth shall be done in the presence of the Inspection Committee.

8-03 INSTALLATION OF CASING AND FILTER

(a) Casing pipe shall be galvanized steel pipe (GSP) unless noted otherwise.

(b) The casing pipe shall be processed strainers at the appropriate positions which shall be adjusted water bed.

(c) The position of water bed shall be searched by a electric water detector or other method by the Contractor. After collating above tests, the suitable position of the strainer of casing shall be decided by the Contractor in the presence of the Inspection Committee.

(d) Size of the slit perforated on the strainer shall be approximately five (5) millimeters in width and 15 cm in length, and its number and arrangement shall be shown as drawings. The processed casing pipe shall carefully by installed into the hole, and crevice between the hole and the casing shall be filled with appropriate filter materials approved by the Inspection Committee.

8-04 WASHING

After installation of the casing and filter, all slime, clay and other washable materials containing in the hole and strainers shall be completely washed out as directed by introducing fresh water, air or a mixture of water and air pressure.

8-05 PUMPING TEST

After completion of making the deep well, pumping test shall be executed by the Contractor and checked by the Inspection Committee. When the Inspection Committee will approve the result of pumping test as a satisfactory, the works may be regarded as completion.

8-06 PAYMENT

Measurement for payment for making hole will be based on the number of linear meters of hole made from the point where the works begins to the bottom of the hole in accordance with the detail drawings or as directed. Payment for making hole will be made at the applicable unit prices. Measurement for payment for casing pipe processed strainers will be based on the number of linear meters. Payment will be made at the unit prices which shall include all costs incidential to processing, assembling, locating, installing the pipe as shown on the drawing or as directed. Measurement for payment for filter materials will be based on the number of cubic meters acceptably placed as computed from the neat lines indicated on the drawings. Payment will be made at the unit price which shall include all costs for furnishing, hauling, handling, and placing the filter materials as required.

PART 9 PUMP FACILITIES

9-01 SCOPE

(a) Submargible motor pump designated in the drawings will be prepared by the contract officer as a lend free facilities to the Contractor. The Contractor shall furnish all labour, materials, equipment and incidents required for installation of the pumps, fittings and appurtenances as shown on the drawings. The fittings are shown as a convenience for the Contractor. It may be necessary to supply and install additional fittings other than those shown on the drawings or to install fittings in different locations. Work to be done shall include hauling, installing, jointing and all other works necessary to produce a completed facility.

(b) The Contractor shall furnish and install pump house, electric wiring, pipes, couplings, fittings, gaskets, flanges, bolts, nuts and all other materials necessary to properly install the works shown on the drawings and as specified.

(c) These facilities shall be strictly in accordance with the manufacture's technical data and printed instruction and permitted by the Inspection Committee. For all kinds of earth works required for the works, the specification for earth and foundation works shall be applied.

9-02 INSTALLATION OF PUMPS

(a) Submargible motor pump

Submargible motor pump shall be installed in the casing set in a deep well. The pump coupled with conduit pipe shall carefully by hunged down with use crane or other suitable method in the presence of the Inspection Committee. Three meter of each conduit pipe made of steel shall be coupled by flanged each other until designated length shown on the drawings and as directed by the Inspection Committee.

The conduit pipe on the way of installation shall be fixed by supporter at the time of jointing with additional pipe so as to not drop intothe casing set. Confirmation of the installation depth of the pump shall be made on the synthetic judgement of the drawings, results of pumping tests, and other informations in the presence of the Inspection Committee.

9-03 INSTALLATION OF PIPE

Water pipe from submargible motor pump to field shall be galvanized steel pipe (GSP) pipe unless noted otherwise. The pipe shall be suitable for field cutting, and coupling. Joints for GSP pipe shall be welded type or flanged type where required and shall be compatible with the pipe where installed. In making solvent welded connections, cleaning dirt and moisture free from pipe and fittings shall be required.

The pipe shall be bedded on fifteen (15) cm depth of sand. The same materials shall be placed along as well as on each side of pipe and compacted up to the crown of the pipe. Ten (10) cm of the same materials shall be carefully compacted in two layers.

9-04 PAYMENT

Measurement for payment for installation of pump facilities ie., pump house, electric wiring, water tanks, pipes, couplings, fittings, gasket, flanges, bolts & nuts and all other materials necessary to properly install the works, will be based on the number of units actually furnished and installed for the various items as shown on the drawings, or as otherwise directed. Payment will be made at the prices bid for the various items.

PART 10 OTHER RELATED CONSTRUCTION WORKS

10-01 GENERAL

The land consolidation works for the experimental field include under this contract construction works for appurtenant structure besides main construction works such as the construction of land shape adjustment, land levelling, farm road and irrigation and drainage canals as well as installation of both deep well pump and home pump.

The said appurtenant structures comprise, diversion facilities, turn-outs, culverts, etc.

The majority of the appurtenant structures shall be concrete structure, which shall be constructed by means of the combination of earth work and concrete work. It means that the Specification indicated in the PART 4, 5 and 7 shall be adoptable for the construction of the appurtenant structure.

From the view-point stated above, the Specification contained in this part describes only size, shape, features and quantity with respect to each of the appurtenant structures.

10-02 DIVERSION FACILITY AND TURN-OUT

(a) The diversion facility shall be made of concrete with eighty centimeters in width and eighty centimeters in length and be constructed having wooden weir plate each at different locations as is seen the drawings.

(b) Turn-out shall be installed with concrete at the location designated on the drawings, respectively the number of which shall be twenty four in total.

10-03 CULVERNT

(a) The culvert shall be provided with concrete structure on the both irrigation canal and drainage canal at the place wherever both the canals meet with farm road, the number of

which is nine in total. The section and length of the culvert is different each at the nine places as is seen in the drawings.

Bill of Quantities

of

Construction of Model Infrastructure
on
Agricultural Extension and
Agricultural Mechanization Project

In the Kasetsart University

Bangkok Office

JAPAN INTERNATIONAL COOPERATION AGENCY

CONSTRUCTION COST

A. Direct

		COST	
1.	Land shape adjustment and land levelling	573,504	฿
2.	Irrigation canals	237,813	฿
3.	Drainage canals	168,708	฿
4.	Farm roads	374,016	฿
5.	Construction of pumping system	240,900	฿
6.	Set-up of water supply pipe	29,770	฿
7.	Appurtenant structures	242,952	฿
8.	Common temporary works	165,000	฿
	Sub-Total	2,032,663	฿

B. Indirect

1.	Overhead	70,000	฿
2.	Profit	150,000	฿
3.	Tax	76,875	฿
	Sub-Total	296,875	฿
	Total	2,329,538	฿
	Round off	(-) 29,538	฿
	Construction Cost	2,300,000	฿

BILL OF QUANTITES

No. 1

Item No.	Description	Unit	Quantity	Unit Price (฿)	Price (฿)	Remarks
1. Land shape adjustment and land levelling						
1-1 Land levelling						
(1) M-a Block						
101	Excavation	cum	300	18	5,400	
102	Spreading	"	300	8	2,400	M-a Block
103	Spreading	"	4,350	8	34,800	From M-d Block
104	Sub-Total				(42,600)	
(2) M-b Block						
105	Excavation	cum	800	18	14,400	
106	Spreading	"	800	8	6,400	M-b Block
107	Spreading	"	1,127	8	9,016	From M-d Block
108	Sub-Total				(29,816)	
(3) M-c Block						
109	Excavation	cum	350	18	6,300	
110	Spreading	"	350	8	2,800	M-c Block
111	Spreading	"	2,400	8	19,200	From M-d Block
112	Sub-Total				(28,300)	
(4) M-d Block						
113	Excavation	cum	8,300	18	149,400	
114	Loading	"	8,199	15	122,985	
115	Hauling	"	4,451	18	80,118	to M-a Block
116	Hauling	"	1,247	13	16,211	to M-b Block
117	Hauling	"	2,501	18	45,018	to M-c Block
118	Sub-Total				(413,732)	
119	Total				514,448	

BILL OF QUANTITES

No. 2

Item No.	Description	Unit	Quantity	Unit Price (₱)	Price (₱)	Remarks
1-2. Land Shape Adjustment						
(1) M-a Block						
120	Excavation	cum	52	18	936	
121	Embankment	"	153	50	7,650	
122	Smoothing of face excavated or filled up	sqm	1,193	2	2,386	
123	Sub-Total				(10,972)	
(2) M-b Block						
124	Excavation	cum	27	27	486	
125	Embankment	"	147	50	7,350	
126	Smoothing of face excavated or filled up	sqm	802	2	1,604	
127	Sub-Total				(9,440)	
(3) M-c Block						
128	Excavation	cum	52	18	936	
129	Embankment	"	153	50	7,650	
130	Smoothing of face excavated or filled up	sqm	1,193	2	2,386	
131	Sub-Total				(10,972)	
(4) M-d Block						
132	Excavation	cum	52	18	936	
133	Embankment	"	153	50	7,650	
134	Smoothing of face excavated or filled up	sqm	1,193	2	2,386	
135	Sub-Total				(10,972)	

BILL OF QUANTITES

No. 3

Item No.	Description	Unit	Quantity	Unit Price (฿)	Price (฿)	Remarks
1-3.	Miscellaneous Construction Works	Ls	1		16,700	
136	Total				573,504	

BILL OF QUANTITES

No. 4

Item No.	Description	Unit	Quantity	Unit Price (₱)	Price (₱)	Remarks
2.	Irrigation Canal					
2-1.	A-1 Line					
201	Excavation	cum	4	35	140	
202	Embankment	"	2	50	100	
203	Foundation concrete	"	0.2	1,375	275	
204	Reinforced concrete	"	0.5	1,375	688	
205	Reinforced iron bar	kg	33	13	429	
206	Form	sqm	9.	240	2,160	
207	Sub-Total				(3,792)	
2-2.	A-2 Line					
208	Excavation	cum	43	35	1,505	
209	Embankment	"	25	50	1,250	
210	Foundation concrete	"	2.8	1,375	3,850	
211	Reinforced concrete	"	7.0	1,375	9,625	
212	Reinforced iron bar	kg	371	13	4,823	
213	Form	sqm	108	240	25,920	
214	Sub-Total				(46,973)	
2-3.	B-1 Line					
215	Embankment	cum	36	50	1,800	
216	Smoothing face of filled up	sqm	376	2	752	
217	Lining concrete	cum	10,9	1,350	14,715	
218	Metal form	sqm	129	200	25,800	
219	Wooden form	"	1.8	250	450	
220	Sub-Total				(43,517)	

BILL OF QUANTITES

No. 5

Item No.	Description	Unit	Quantity	Unit Price (฿)	Price (฿)	Remarks
2-4. B-2 Line						
221	Embankment	cum	36	50	1,800	
222	Smoothing face of filled up	sqm	370	2	740	
223	Lining concrete	cum	10.8	1,375	14,850	
224	Metal form	sqm	1.8	200	360	
225	Wooden form	"	128	240	30,720	
226	Sub-Total				(48,470)	
2-5. C-1 Line						
227	Embankment	cum	37	50	1,850	
228	Lining concrete	"	11.7	1,375	16,088	
229	Metal form	sqm	130	200	26,000	
230	Wooden form	"	1.9	240	456	
231	Smoothing face of filled up	"	389	2	778	
232	Sub-Total				(45,172)	
2-6. C-2 Line						
233	Lining concrete	cum	11.4	1,375	15,675	
234	Wooden form	sqm	1.9	240	456	
235	Metal form	"	126	200	25,200	
236	Embankment	cum	36	50	1,800	
237	Smoothing face of filled up	sqm	379	2	758	
238	Sub-Total				(43,889)	
2-7. Miscellaneous Construction Works		Ls	1		6,000	
239	Total				237,813	

BILL OF QUANTITES

No. 6

Item No.	Description	Unit	Quantity	Unit Price (฿)	Price (฿)	Remarks
3. Drainage Canal						
3-1. C-1 Line						
301	Excavation	cum	67	35	2,345	
302	Smoothing face of excavated	sqm	332	2	664	
303	Sub-Total				(3,009)	
3-2. C-2 Line						
304	Excavation	cum	103	35	3,605	
305	Lining concrete	"	0.2	1,375	275	
306	smoothing face of excavated	sqm	409	2	818	
307	Metal form	sqm	2.2	200	440	
308	Wooden form	"	0.1	240	24	
309	Sub-Total				(5,162)	
3-3. D-1 Line						
310	Excavation	cum	67	35	2,345	
311	Smoothing face of excavated	sqm	332	2	664	
312	Sub-Total				(3,009)	
3-4. D-2 Line						
313	Excavation	cum	131	35	4,585	
314	Smoothing face of excavated	sqm	463	2	926	
315	Lining concrete	cum	0.2	1,375	275	
316	Metal form	sqm	2.7	200	540	

Item No.	Description	Unit	Quantity	Unit Price (₱)	Price (₱)	Remarks
317	Wooden form	sqm	0.1	240	24	
318	Sub-Total				(6,350)	
3-5. F-1 Line						
319	Excavation (by Manpower)	cum	35	35	1,225	
320	Excavation (by Equipment)	cum	66	18	1,188	
321	Smoothing face of excavated	sqm	206	2	412	
322	Lining concrete	cum	18.0	1,375	24,750	
323	Reinforced concrete	cum	0.65	1,375	894	
324	Form	sqm	6.5	240	1,560	
325	Reinforced iron bar	kg	19	13	247	
326	Wooden form	sqm	2.1	240	504	
327	Metal form	"	167.4	200	33,480	
328	Sub-Total				(64,260)	
3-6. F-2 Line						
329	Excavation (by Manpower)	cum	53	53	1,855	
330	Excavation (by equipment)	cum	100	18	1,800	
331	Loading and Hauling	"	143	15	2,145	
332	Smmothing face of excavated	sqm	216	2	432	
333	Lining concrete	cum	18.9	1,375	25,988	
334	Metal form	sqm	168.2	200	33,640	
335	Wooden form	"	1.8	240	432	
336	Sub-Total				(66,292)	

BILL OF QUANTITES

No. 8

Item No.	Description	Unit	Quantity	Unit Price (₱)	Price (₱)	Remarks
3-7. F-3 Line						
337	Excavation	cum	202	35	7,070	
338	Smoothing of face excavated	sqm	389	2	778	
339	Sub-Total				(7,848)	
3-8. F-4 Line						
340	Excavation	cum	202	35	7,070	
341	Smoothing of face excavated	sqm	454	2	908	
342	Sub-Total				(7,978)	
3-9. Miscellaneous construction works		Ls	1		4,800	
343	Total				168,708	

BILL OF QUANTITES

No. 9

Item No.	Description	Unit	Quantity	Unit Price (฿)	Price (฿)	Remarks
4..Farm Road						
4-1. A Line						
401	Excavation	cum	44	23	1,012	
402	Embankment	"	176	70	12,320	with hauling
403	Pavement (Laterite)	"	64	230	14,720	
404	Smoothing of face excavated or filled up	sqm	105	2	210	
405	Sub-Total				(28,262)	
4-2. B Line						
406	Embankment	cum	178	70	12,460	with hauling
407	Pavement (Laterite)	"	363	230	83,490	
408	Smoothing of face excavated or filled up	sqm	242	2	484	
409	Sub-Total				(96,434)	
4-3. C Line						
410	Excavation	cum	48	23	1,104	
411	Embankment	"	77	50	3,850	
412	Embankment	"	314	70	21,980	with hauling
413	Pavement (Laterite)	"	145	230	33,350	
414	Smoothing of face excavated or filled up	sqm	411	2	822	
415	Sub-Total				(61,106)	

BILL OF QUANTITES

No. 10

Item No.	Description	Unit	Quantity	Unit Price (B)	Price (B)	Remarks
4-4. D Line						
416	Excavation	cum	48	23	1,104	
417	Embankment	cum	228	50	11,400	
418	Embankment	cum	501	70	35,070	with hauling
419	Pavement (Laterite)	cum	145	230	33,350	
420	Smoothing of face excavated or filled up	sqm	411	2	822	
421	Sub-Total				(81,746)	
4-5. E Line						
422	Excavation	cum	21	21	483	
423	Embankment	cum	41	50	2,050	
424	Embankment	cum	160	70	11,200	with hauling
425	Pavement (Laterite)	cum	64	230	1,472	
426	Smoothing of face excavated or filled up	sqm	193	2	386	
427	Sub-Total				(15,591)	
4-6. F Line						
428	Pavement (Laterite)	cum	161	230	37,030	
429	Smoothing of face excavated or filled up	sqm	118	2	236	
430	Sub-Total				(37,266)	
4-7. Access Road						
431	Excavation	cum	69	23	1,587	
432	Embankment	cum	28	50	1,400	
433	Embankment	cum	285	70	19,950	with hauling

BILL OF QUANTITES

No. 11

Item No.	Description	Unit	Quantity	Unit Price (฿)	Price (฿)	Remarks
434	Pavement	cum	83	230	19,090	
435	Smoothing of face excavated of filled up	sqm	392	2	784	
436	Sub-Total				(42,811)	
4-8.	Miscellaneous construction works	Ls	1		10,800	
437	Total				374,016	

BILL OF QUANTITES

No. 12

Item No.	Description	Unit	Quantity	Unit Price (฿)	Price (฿)	Remarks
5. Construction of Pumping System						
5-1. Construction of Pumping System						
501	Drilling well	Ls	1		190,000	include installation of casting
502	Base of pump	"	1		4,500	
503	Set-up pump and acceseries	"	1		9,400	
504	House	"	1		30,000	
505	Sub-Total				(233,900)	
5-2. Miscellaneous construction works		Ls	1		7,000	
506	Total				240,900	
6. Set-up of Water Supply Pipe						
6-1. Set-up of water supply pipe						
601	Pipe setting	m	350	Ls	28,000	ϕ=100 m/m
602	"	"	244			ϕ= 75 m/m
603	Plain concrete	m^3	0.2	1,350	270	
604	RC pipe	m	2.0	350	700	ϕ= 300 m/m
605	Sub-Total				(28,970)	
6-2. Miscellaneous construction works		Ls	1		800	
606	Total				29,770	

BILL OF QUANTITES

No. 13

Item No.	Description	Unit	Quantity	Unit Price (₱)	Price (₱)	Remarks
7. Appurtenant Structures						
7-1. Intake						
701	Excavation	cum	2	35	70	
702	Back fill	cum	1	20	20	
703	Reinforced concrete	cum	0.3	1,375	413	
704	Plain concrete	cum	0.1	1,350	135	
705	Form	sqm	4.3	240	1,032	
706	Reinforced iron bar	kg	11	13	143	
707	Sub-Total				(1,813)	
7-2. Culvert in field area						
708	Excavation	cum	102	35	3,570	
709	Back fill	cum	54	20	1,080	
710	Reinforced concrete	cum	29.7	1,375	40,838	
711	Plain concrete	cum	3.2	1,350	4,320	
712	Form	sqm	204	240	48,960	
713	Reinforced iron bar	kg	845	13	10,985	
714	RC pipe	m	9.6	850	8,160	
715	Lining concrete	cum	1.2	1,375	1,650	
716	Sub-Total				(119,563)	
7-3. Turnout						
717	Plain concrete	cum	0.1	1,350	135	
718	Form	sqm	0.8	240	192	
719	Sub-Total				(327)	

BILL OF QUANTITES

No. 14

Item No.	Description	Unit	Quantity	Unit Price (₱)	Price (₱)	Remarks
7-4. Access Road						
	(Irrigation Canal)					
720	Back fill	cum	13	20	260	
721	Reinforced concrete	cum	5.4	1,375	7,425	
722	Plain concrete	cum	2.2	1,350	2,970	
723	Form	sqm	30.7	240	7,368	
724	Reinforced iron bar	kg	256	13	3,328	
725	Sub-Total				(21,351)	
	(Drainage Canal)					
726	Back fill	cum	14	20	280	
727	Reinforced concrete	cum	5.4	1,375	7,425	
728	Form	sqm	30.7	240	7,368	
729	Feinforced iron bar	kg	256	13	3,328	
730	PC pipe	m	48	650	31,200	
731	Sub-Total				(49,601)	
7-5. Gate						
732	Plain concrete	cum	0.1	1,350	135	
733	Form	sqm	0.33	240	79	
734	Stop log	cum	0.1	11,000	1,100	
735	Sub-Total					
7-6. Culvert at end point of Drainage Canal						
736	Excavation	cum	41	35	1,435	
737	Back fill	cum	16	20	320	
738	Reinforced concrete	cum	13	1,375	17,875	
739	Plain concrete	cum	1.0	1,350	1,350	
740	Form	sqm	19.2	240	4,608	

BILL OF QUANTITES

No. 15

Item No.	Description	Unit	Quantity	Unit Price (B)	Price (B)	Remarks
741	Reinforced iron bar	kg	215	13	2,795	
742	RC pipe	m	16	850	13,600	
743	Sub-Total				(41,983)	
7-7.	Miscellaneous construction works	Ls	1		7,000	
744	Total				242,952	
8.	Common temporary works					
801		Ls	1		165,000	

LIST OF UNIT COST

No.	ITEM	UNIT	UNIT COST (β)	REMARKS
1	Excavation by Manpower	m^3	35	Normal soil
2	Excavation by Bull Dozer(11 ton)	m^3	18	"
3	Excavation by Back-Hoe Shovel(0.35m^3)	m^3	23	"
4	Compacting by Manpower	m^3	25	
5	" Compactor	m^3	15	
6	" Vibration Roller	m^3	13	
7	Reinforced Concrete	m^3	1,375	
8	Lining Concrete	m^3	1,375	
9	Plain Concrete	m^3	1,350	
10	Mortal	m^3	1,300	
11	Wooden Form of Concrete	m^2	240	
12	Metal Form of Concrete	m^2	200	
13	Processing and Assembling of Reinforced Iron Bar	kg	13	
14	Loading by Tractor Shovel (1.2 m^3)	m^3	15	
15	Hauling by Dump Truck (8 ton)	m^3	15	L=250m
16	"	m^3	20	L=400m
17	"	m^3	25	L=1,000m
18	"	m^3	15	L=200m
19	Spreading by Bull Dozer (11 ton)	m^3	8	
20	Smoothing of Face Excavated or Filled up	m^2	2	
21	Pipe Setting	m	40	

โปรดส่งคืนต้นฉบับหนังสือ
ค้ำประกันให้ธนาคาร
เมื่อหมดอายุแล้วด้วย.

THE BANK OF TOKYO, LTD.

Cable Address
"TOHBANK BANGKOK"

BANGKOK OFFICE
Thaniya Building
62 Silom Road, Bangkok 5

Tel. 2330790-8
P.O. Box 502

Date : January 24, 1984

Mr.Akira Kasai,
The Resident Representative,
Japan International Cooperation Agency,
Bangkok Office.

Gentlemen:

Letter of Guarantee No. BKG165-84/172
in your favour for Bht115,000.-
a/c Thai Takenaka International Ltd.

We hereby guarantee Thai Takenaka International Ltd.
to the extent of Bht115,000.-(BAHT ONE HUNDRED FIFTEEN THOUSAND ONLY)
being Performance Bond for the Construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project of Kasetsart University.

This Letter of Guarantee is effective from February 5, 1984 to June 14, 1985 after which date this Guarantee will automatically become null and void. Any claim in this consequence should also be submitted to us on or before the said expiry date.
Please return this Original Letter to us at your earliest convenience upon expiration.

Yours faithfully,
THE BANK OF TOKYO, LTD.
Bangkok Office

p.p. Manager
K. TERASHIMA

บริษัท ไทยทาเคนากา สากลก่อสร้าง จำกัด
THAI TAKENAKA INTERNATIONAL LTD.
BOONMIR BLDG., 5FL.
138 SILOM ROAD, BANGKOK.
TEL : 233-3246, 3837 234-0072, 4501, 5314, 6718

B-095/84

January 26, 1984

Japan International Cooperation Agency,
Bangkok Office.

Dear Sirs,

B I L L
Construction of Model Infrastructure on
Agricultural Extension and Agricultural
Mechanization Project in the Kasetsart University
-Advance Payment-

In accordance with our Contract, we respectfully request that you make Advance Payment for the amount of ฿690,000.- (Baht Six Hundred Ninety Thousand Only) for the subject work.

Reference:

Contract Amount	฿2,300,000.-
Amount to be paid this time (30%)	690,000.-
Balance	1,610,000.-

Your early payment of the above stated amount will be highly appreciated.

Yours sincerely,

THAI TAKENAKA INTERNATIONAL LTD.

.....
Taketsugu Nunose
Managing Director

ทะเบียนการค้า 10 37 9306

บริษัท ไทยทาเคนาคา ตากตก่อสร้าง จำกัด
THAI TAKENAKA INTERNATIONAL LTD.
5FL. BOONMITR BLDG., 138 SILOM ROAD, BANGKOK.
ชั้น 5 อาคารบุญมิตร เลขที่ 138 ถนนสีลม กรุงเทพมหานคร
TEL. 2333246, 2333637, 2340072, 2344501, 2345314

ใบเสร็จรับเงิน
RECEIPT

เลขที่ No. 072/84

กรุงเทพฯ 30 มกราคม 2527
Bangkok January 30, 1984

ได้รับจาก องค์การร่วมมือระหว่างประเทศแห่งญี่ปุ่น สำนักงานกรุงเทพฯ
Received from Japan International Cooperation Agency, Bangkok Office

จำนวนเงิน หกแสนเก้าหมื่นบาทถ้วน
Amount Six Hundred Ninety Thousand Only

ชำระค่า Advance Payment
Payment for Const of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project in the Kasetsart University

บาท ๖๙๐,๐๐๐.-xxxx
Baht

(B-095/84)

บริษัท ไทยทาเคนาคา ตากตก่อสร้าง จำกัด
THAI TAKENAKA INTERNATIONAL LTD.

ผู้รับเงิน Collector

ใบเสร็จฉบับนี้จะสมบูรณ์ต่อเมื่อผู้จัดการและผู้รับเงินเซ็นชื่อร่วมกัน
This receipt is effective only when signed by manager and collector

ผู้จัดการ Manager

บริษัท ไทยทาเคนากา สากลก่อสร้าง จำกัด
THAI TAKENAKA INTERNATIONAL LTD.
BOONMITR BLDG., 5FL.
138 SILOM ROAD, BANGKOK.
TEL : 233-3246, 3937 234-0072, 4501, 5314, 6718

April 30, 1984

Japan International Cooperation Agency,
Bangkok Office.

Dear Sirs,

B I L L
Construction of Model Infrastructure on
Agricultural Extension and Agricultural
Mechanization Project in the Kasetsart University
-Interim Payment-

In accordance with our Contract, we respectfully request that you make Interim Payment for the amount of ฿920,000.-(Baht Nine Hundred Twenty Thousand Only) for the subject work.

Reference:

Contract Amount	฿2,300,000.-
Amount already paid	690,000.-
Amount to be paid this time	920,000.-
Balance	690,000.-

Your early payment of the above stated amount will be highly appreciated.

Yours sincerely,
THAI TAKENAKA INTERNATIONAL LTD.

.....
Taketsugu Hunose
Managing Director

บริษัท ไทยทาเคนาคา สากลก่อสร้าง จำกัด
THAI TAKENAKA INTERNATIONAL LTD.

ทะเบียนการค้า 10 37 9306

บริษัท ไทยทาเคนาคา สากลก่อสร้าง จำกัด
THAI TAKENAKA INTERNATIONAL LTD.
5Fl. BOONMITR BLDG. 138 SILOM ROAD. BANGKOK
ชั้น 5 อาคารบูญมิตร เลขที่ 138 ถนนสีลม กรุงเทพมหานคร
TEL. 2333246. 2333837. 2340072. 2344501. 2345314

เลขที่ 319/84
No.

ใบเสร็จรับเงิน
RECEIPT

กรุงเทพฯ วันที่ 30 เมษายน 2527
Bangkok April 30, 1984

ได้รับจาก องค์การร่วมมือช่วยเหลือระหว่างชาติแห่งญี่ปุ่น สำนักงานกรุงเทพ
Received from Japan International Cooperation Agency, Bangkok Office.

จำนวนเงิน เก้าแสนสองหมื่นบาทถ้วน
Amount Nine Hundred Twenty Thousand Only

ค่าก่อสร้างงานเบื้องต้นโครงการกลไกรรมในมหาวิทยาลัย เกษตรศาสตร์ -งวดกลาง-
ชำระค่า Construction of Model Infrastructure on Agricultural Extension and Agricultural
Payment for Mechanization Project in the Kasetsart University -Interim Payment-

บาท
Baht [redacted]

บริษัท ไทยทาเคนาคา สากลก่อสร้าง จำกัด
THAI TAKENAKA INTERNATIONAL LTD.

ผู้รับเงิน
Collector

ผู้จัดการ
Manager

ใบเสร็จฉบับนี้จะสมบูรณ์ต่อเมื่อผู้จัดการและผู้รับเงินเซ็นชื่อร่วมกัน
This receipt is effective only when signed by manager and collector

บริษัท ไทยทาเคนากา สากลก่อสร้าง จำกัด
THAI TAKENAKA INTERNATIONAL LTD.
BOONMITR BLDG., 6FL.
138 SILOM ROAD, BANGKOK.
TEL : 233-3240, 3037 234-0072, 4601, 5314, 8718

B-349/84

June 15 , 1984

Japan International Cooperation Agency,
Bangkok Office

Dear Sirs,

B I L L
Construction of Model Infrastructure on
Agricultural Extension and Agricultural
Mechanization Project in the Kasetsart University
-Last Payment-

In accordance with our Contract, we respectfully request that you make Last Payment for the amount of ฿690,000.-(Baht Six Hundred Ninety Thousand Only) for the subject work.

Reference:

Contract Amount	฿2,300,000.-
Amount already paid	1,610,000.-
Amount to be paid this time	690,000.-
Balance	0.-

Your early payment of the above stated amount will be highly appreciated.

Yours sincerely,

THAI TAKENAKA INTERNATIONAL LTD.

.....
Taketsugu Nunose
Managing Director

ทะเบียนการค้า 10 37 9306

บริษัท ไทยทาเคนากา สากลก่อสร้าง จำกัด
THAI TAKENAKA INTERNATIONAL LTD.
5FL. BOONMITR BLDG., 138 SILOM ROAD, BANGKOK
ชั้น 5 อาคารบุญมิตร เลขที่ 138 ถนนสีลม กรุงเทพมหานคร
TEL. 2333246, 2333837, 2340072, 2344501, 2345314

ใบเสร็จรับเงิน
RECEIPT

เลขที่ No. 422/84

กรุงเทพฯ Bangkok, มิถุนายน June 2527, 1984

ได้รับจาก Received from องค์การความร่วมมือระหว่างประเทศแห่งญี่ปุ่น สำนักงานกรุงเทพ Japan International Cooperation Agency, Bangkok Office

จำนวนเงิน Amount หกแสนเก้าหมื่นบาทถ้วน Six Hundred Ninety Thousand Only

ชำระค่า Payment for ก่อสร้างงานเบ็ดเตล็ดโครงการฝึกอบรมในมหาวิทยาลัย เกษตรศาสตร์ -งวดสุดท้าย- Construction of Model Infrastructure on Agricultural Extension and Agricultural Mechanization Project in the Kasetsart University -Last Payment-

บาท Baht [redacted] (B-349/84)

บริษัท ไทยทาเคนากา สากลก่อสร้าง จำกัด
THAI TAKENAKA INTERNATIONAL LTD.

ผู้รับเงิน Collector

ผู้จัดการ Manager

ใบเสร็จฉบับนี้จะสมบูรณ์ต่อเมื่อผู้จัดการและผู้รับเงินเซ็นชื่อร่วมกัน
This receipt is effective only when signed by manager and collector

บริษัท ไทยทาเคนากา สากลก่อสร้าง จำกัด
THAI TAKENAKA INTERNATIONAL LTD.

6-2 供与機材に関する資料

秘密標記（赤色）

（　　　）　　第117号

昭和59年1月12日

外務大臣殿

在タイ
橘大使

（件名）

プロジェクト方式技術協力（カセサート大学農業機械化）

引用公・電信 日付・番号	

今般、DTECより、口上書をもって

標記プロジェクト圃場整備に係る機材供与

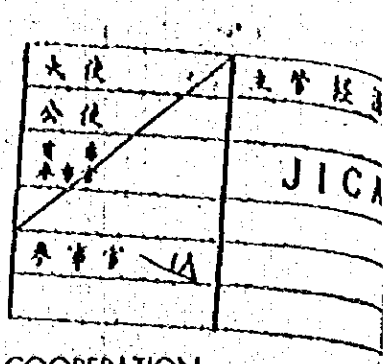
要請越したところ、よろしくお取計らい願いたい。

口上書（写）及びA4フォーム別添送付申し上げる。（了）

付属添付☑　付属空便（行）☐　付属空便（DP）☐　付属航便（行）☐　付属航便（秘）☐

本信送付先：
本信写送付先：
省内写配布希望先：

GA-3-1　　在外公館



DEPARTMENT OF TECHNICAL AND ECONOMIC COOPERATION
Krung Kasem Road, Bangkok, Thailand
Cable: DTEC.
TEL. 817555

KU

Kibuchi

No. 1703 / 34471

The Department of Technical and Economic Cooperation presents its compliments to the Embassy of Japan and, with reference to the Record of Discussions dated April 30, 1981, has the honour to request, on behalf of Kasetsart University, equipment for the Agricultural Extension and Mechanization Project, under the Technical Cooperation Scheme of the Colombo Plan.

Enclosed herewith are 8 copies of From A4 for the Embassy's consideration.

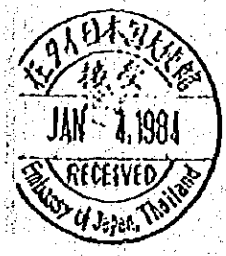
The Department of Technical and Economic Cooperation avails itself of this opportunity to renew to the Embassy the assurances of its highest consideration.

December 27, B.E. 2526 (1983)

Encls.

The Embassy of Japan
Bangkok.

DEC-II/OP
Tel. 2811031



TO MEC ; Dec 12, FY93

Form A 4.
(1962 Revision)

THE COLOMBO PLAN
COUNCIL FOR TECHNICAL CO-OPERATION IN ASIA AND THE PACIFIC
Equipment for Training or Research Institutes and for Equipment accompanying Experts

APPLICATION

By the Government of Thailand

from The Government of Japan
(Country)

Note—(a) This Form has been devised for the general guidance of co-operating countries in order to facilitate the supply of relevant information and data necessary to afford an adequate appreciation of the nature of the technical co-operation required. The careful completion of this application form will avoid much reference back and lead to speedier action. Separate forms A 4 should be used for requests for equipment for each individual institute or project.

(b) The requisite number of copies of the Form A 4, including a copy for the Colombo Plan Bureau, duly endorsed by the appropriate Foreign Aid Department of the requesting Government should be forwarded to the donor Government concerned through the appropriate channels.

1. Background Information Please describe as concisely as possible the general outlines of the project for which the equipment is required, indicating whether the latter is (a) for use by an expert in the performance of his duties (b) for a training scheme or institution or (c) for a research institution. If either (b) or (c) please say whether the equipment is for the establishment of a new institution or the expansion or re-organisation of an existing one (e.g. by the provision of a new department, &c.). The name and exact location of the institution, its approximate cost and the authority responsible for it should be stated. Where appropriate, details should be given of the availability of any services required for the operation of the equipment. This would include operation by electricity (i.e. type of current, periodicity, voltage and any variations, phases, frequency, etc. and if D.C. is the only current available, please give full details), water reticulation or steam, gas, etc. Details of similar equipment already in use should be given.	The equipment is required for the Agricultural Extension and Mechanization Project which is being implemented both by the Kasetsart University and the JICA. They will be used for the construction of the model infrastructure at the experimental field, Kamphaengsaen Campus.
2. Description of equipment required Please give a full description of each item and general specifications where possible. The manufacturer and estimated cost of each item, if known together with details of the proposed end use of item should be given. Where applicable, give details of any special packing or tropic proofing required and indicate whether handbooks or instruction data supplied in English will suffice. If appropriate, please indicate any required priorities or phasing of deliveries and advise whether adequate facilities exist for maintenance and servicing of the type of equipment requested. (If lengthy, detailed lists should be annexed, it would be convenient to have separate annexures for (a) films; (b) books and (c) other equipment.)	See the attached Appendix I
3. Has this equipment request already been directed to any other Agency or Colombo Plan country and, if so, to whom was it addressed and with what result?	No
4. Has the list of equipment already been discussed with representatives of the supplying country/ies? If so, please indicate what stage the discussions have reached.	Yes, the list of equipment has already been discussed with Mr. S. Imaizumi, expert for the Center.
5. Furnish full particulars in respect of— (a) Consignee; (b) Official to receive documents and enquiries; and (c) Clearing agent at port of entry.	a) Kasetsart University, Kamphaengsaen Campus, Thailand b) Rector of Kasetsart University c) The Express Transportation Organization of Thailand
6. Where equipment is required for use by an expert Please indicate— (a) The country or agency from which the expert has been requested or obtained (b) His duties and length of secondment (a reference to the relative Form A.1 will suffice when the expert is being provided by the country to which the equipment request is addressed)	a) Japan b) To give advice(s), suggestion(s) and recommendation(s) for both technical and operational of the research project and carry out the research for 5 years

(c) What use is proposed for the equipment when the expert's period of secondment terminates?	c) The equipment will be used for research activities of Kasetsart University staff.
(d) By what date is the equipment required?	d) By January 1984
7. Where equipment is required for Training or Research Institutions Please indicate— (a) Nature and standard of training or research to be undertaken	a) The equipment is provided for research activities in order to get a new technology and agricultural machinery for proper mechanization system.
(b) Total number of students to be accommodated from within the country or from elsewhere in the Region, the qualifications for admission, the duration of courses, and the annual output of trainees	b) Hundreds of students will be accommodated in this project. The qualification for admision is up to the level of offered courses, 5-6 training courses annually for 4-12 weeks period. The annual output of trainees will be 100-200 persons
(c) Whether there is already a similar institute (s) in existence in the country. If so, please give details.	c) No
(d) Whether buildings are already available. If not, has construction started and when is it expected to be completed?	d) Yes
(e) Whether qualified staff to handle the equipment has been recruited or is proposed to be recruited locally. If not, is it proposed— (i) to recruit foreigners under aid-programmes? (ii) to train locally recruited personnel abroad in handling equipment? (the reference numbers of any Forms A. 1 or A. 2 relating to such requests should be quoted)	e) Yes
(f) Taking into account the answers to (d) and (e) above, what is the date by which the equipment is required and the date on which training or research work is to commence?	f) The equipment is required as soon as possible in order to facilitate the research capability
(g) Whether any assistance in drawing up the Scheme has been obtained from outside experts? [Any specialist reports or Government surveys (e.g. Educational Committee Reports, etc.), bearing on the request should be provided if possible)	g) No
8. Correspondence Name, Postal and Telegraphic Address of official to whom correspondence regarding this application is to be forwarded	Director-General Department of Technical and Economic Co-operation Krung Kasem Road Bangkok, Thailand

Signed Kiwa Chutima
for Counterpart Agency
Vice-Rector
Kasetsart University
Date : DEC 1983

Signed : ....
on behalf of the Government of..

For use only by Donor Government

Application accepted/rejected/withdrawn

Date : ....

on behalf of the Department of..

Appendix I

List of the equipment for the construction works of Model Paddy Field

Item	Estimation
	Baht
- Casing	230,000
- Pump System	545,000
Pump	(170,000)
Valve	(20,000)
Piping of pump system	(115,000)
Pressure tank	(125,000)
Electric control pannel	(115,000)
- Distribution pipe and stop valve	85,000
- Others	20,000
Total	Baht 880,000
	Yen (9,200,000)

文書受付	事業担当部				プロジェクト		
					リーダー	調整員	主管
					(今泉)		(今泉)

事　務　連　絡

発信番号（58－16）
発信日 59年 1月 日

国際協力事業団
農業開発協力部長　殿

プロジェクト名 カセサート大学農業機械
リーダー名 今泉 七郎

件名 昭和58年度農業機械センターに係る圃場整備に伴う機材の現地調達申請について

下記機材を現地調達いたしたく申請します。

記

1. 機材名及び見積額

(1) 深井戸用ケーシング φ200m/m ℓ:120m	218,000B
(2) ポンプ一式	575,000
a) ポンプ本体	(210,000)
b) バルブ類一式	(19,000)
c) ポンプまわり配管一式	(123,000)
d) 圧力タンク	(82,000)
e) 配電盤一式	(141,000)
(3) 圃場内配管一式	84,000
合計	877,000B
円換算 (1B = 10.452円)	≒9,200,000円

2. 見積書　　別添のとおり

以上

S55. 3 100×100（農開）

(№ 1)

ยูไนเต็ด วอเตอร์เวลล์ คอนสตรัคชั่น
WATER WELL CONSTRUCTION LTD., PART.
TECHAVANICH ROAD, TALAT MAI BANG SUI,
A. DUSIT, BANGKOK, THAILAND.
TEL. 5856570

Bangkok, January 6, 1984.

Attention : Japan International Corp. Agencies.

Gentlemen :

We are pleased to offer our quotations of API. casing and stainless wire wound screen for using for one water well at UK, Kampaeng - Saen Campus at Lum sum amount for Baht 218,000.00 (Baht, Two hundred eighteen thousand only)

We are looking forward to the opportunity of serving you.

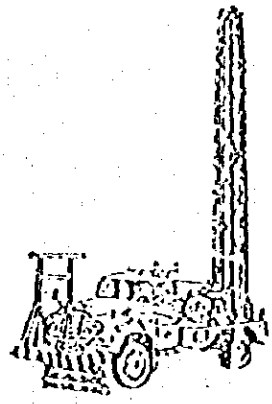
Very truly yours,

UNITED WATERWELL CONSTRUCTION LTP. PART.

Charo Tantisewi

Charo Tantisewi

Manager



ESTIMATE

STI SIAM TRADING & INVESTMENT CO.
G.P.O. BOX 1364 BANGKOK, THAILAND
CABLE SIAMTRAIN BANGKOK

Messrs. JICA Bangkok Office

Bangkok

Date January 5, 1984

(No. EMA2-3217)

Reference :

Delivery : End of April, 1984

Payment : Cash on delivery

Weight: Net Gross Measurement :

Quantity	Description	price	amount
	KUBOTA Submersible pump system.		
1 set	Pump Model : BSM8010FK (0.65m³/min.) with cable, base plate, vent pipe, air valve, compound gage, bolt and nut, water level detector, cable band.		BT.210,0
1 set	Valve, 80Ø Sluice valve... 1 piece 80Ø Check valve... 1 piece 100Ø Sluice pipe ... 1 piece		BT. 19,0
1 set	Piping for pump system Rising pipe 2.75m x 80Ø 32 pcs with bolts and nuts, packing and piping materials		BT.123,0
1 set	Pressure Tank 1 m³, Vertical type made of steel		BT. 82,0
1 set	Electric control panel, out-door self standing type		BT.141,0
	Total		BT.575,0

REMARKS:

1. Delivery Point : Kasetsart Univ. Kamphengsaen Agricultural Machinery Cent
2. Installation charges are not included
3. Validity of estimate : February 15, 1984.

SIAM TRADING & INVESTMENT CO., LTD.

A. OHOZASA
P.P, Manager Machinery Dept.

E. & O. E.

บริษัท ช. สัมพันธ์โลหะกิจ จำกัด
建發有限公司
CHOR SAMPAN COMPANY LIMITED
เลขที่ 90 ซอยสุขา 1 ถนนข้าวหลาม แขวงคลองเตย เขตสัมพันธวงศ์ กรุงเทพมหานคร
☎ 2343394, 2243396

1 FEBRUARY 1984

JAPAN INTERNATIONAL

COOPERATION AGENCY

JAPAN

GENTLEMEN,

We are proud offer you the equipments using in plumbing as following 59 lengths

59 set	(350)	G.S.P	pipe	4" / 6 m	785/6 m	46,315.- baht
41 "	(246)	"	"	3" / 6 m	554/6 m	22,714.- "
9 "	dboe	"	"	4" / 90°	275 baht	2,475.- "
3 "	"	"	"	3" / 90°	180 "	540.- "
8 "	tee	"	"	4" / 3"	340 "	2,720.- "
5 "	gatebalve(KITZ)	"	3" / 125 p		1,850 "	9,250.- "
10 "	omega clamp	"	4"		170.10 "	1,701.- "
				Miscellaneous materials		9,285 "
				Total		95,000 "

Hope to service you in this good opportunity

Youre truly

Vichai sithrun-chrm

(Manager and director)

TOKYO JICA 31 1633

AKIRA KASAI C/O NIHONTAISI BANGKOK

(KASETSART KIKAIKA) AD1194
OODEN AD1155 NI KANSHI,
DENPUNCHUU 2) KIKAIKADUMON(9,953,000)YEN20(9,200,000)YENNI
TEISETARITAI.
JICAHDQ

COL AD1194 AD1155 2) 9,953,000 9,200,000

予定価格調書

金　218,000　バーツ

件　名　カセサート大学農業機械化プロジェクトに係る現地調達機材（ケーシング）の購入

上記のとおり決定する。

昭和59年2月9日

国際協力事業団
契約担当役
バンコック事務所
所長　河西　明

予定価格下調書

金 218,000 バーツ

件 名 カセサート大学農業機械化プロジェクトに係る現地調達機材(ケーシング)の購入

上記のとおり見積しました。

内訳は、別紙予定価格下調内訳書のとおりです。

昭和57年 3月 3日

国際協力事業団

バンコック海外事務所

菊地文夫

ยูไนเต็ด วอเตอร์เวลล์ คอนเสตรัคชั่น
UNITED WATER WELL CONSTRUCTION LTD., PART.
TECHAVANICH ROAD, TALAT MAI BANG SUI,
A. DUSIT, BANGKOK, THAILAND.
TEL. 5856570

Bangkok, January 6, 1984.

Attention : Japan International Cooperation Agency

Gentlemen :

We are pleased to offer our quotations of API. casing and stainless wire wound soreen for using for one water well at KU, Kampaeng - Saen Campus at Lum sum amount for Baht 218,000.00 (Baht, Two hundred eighteen thousand only)

We are looking forward to the opportunity of serving you.

Very truly yours,

UNITED WATER WELL CONSTRUCTION LTP. PART.

Chare Tantiseui

Manager

บริษัท พันทิพย์เฮ้าส์ จำกัด PANTIP HOUSE
เลขที่ ๒๐๕/๕๙ ถนนงามวงศ์วาน บางเขน กทม. ๑๐๒๑๐ 205/59 Ngam wong wan Bangkhen
โทร. 5881992 Tel. 5881992
PANTIP HOUSE COMPANY LIMITED

January 23, 1984

Attention : Japan International Cooperation Agency

Gentlemen :

We are pleased to offer our quatation of ϕ 8" API. Casing and Stainless Screen for using with water well at Kampang Sean, Kasetsart University. Lum sum amount ฿ 231,000.00 (Two hundred thirty one thousand only)

We hope that our quatation will be satisfactory to you. We look forward to the opportunity of serving you.

Very truly yours

Prachak Chaiyakiat
Manager

บริษัท ไทยธรณีเทคนิค จำกัด
THAI GEOTECHNICS CO.,LTD.

17/4 ซอย 43 ถนนลาดพร้าว
แขวงวังทองหลาง กทม. 10

17/4 Soi 43 Ladprao Road.,
Huaykwang, BKK. 10

TEL. 511-0217

January 23, 1984

Attention : Japan International Cooperation Agency

Gentlemen :

We are pleased to offer our quotation of ϕ 8" API - casing and stainless screen for using with water well at Kampaeng Saen, Kasetsart Univerolty. Lum sum amount Of ฿ 249,000.- (Two Hundred and Fourty nine Thousand Baht Only).

We hope our quetation will be accepted and looking forward of serving you.

Very truly yours,

(Sayant Sutthitavil)

Managing Director

CONTRACT

FOR SUPPLY AND DELIVERY OF LOCAL PROCUREMENT

(Casing for Deep Well)

This Contract is executed and delivered this February , 1984

United Water Well Construction Ltd.,Part.

89/24 Techavanich Road, Talat Mai Bang Sui, A. Dusit, Bangkok

representated by Mr. Chare Tantisewi, Manager and herein called "Seller" and

Japan International Cooperation Agency (JICA)

Bangkok Office, C/O Embassy of Japan, Bangkok

represented by Mr. Akira Kasai, The Resident Representative and herein called "Buyer"

The Seller and the Buyer mutually agrees as follows:

1. Contract Documents

The following documents are attached to this Contract and are incorporated and made a part of this Contract, as though fully written out and set forth herein: QUOTATION dated January 6,1984.

2. Agreement for sale

The Seller agrees to sell, and the Buyer agrees to buy the Casing for Deep Well as are described in the Contract documents, Total amount Baht 218,000.-(Baht Two Hundred Eighteen Thousand Only)

3. Delivery Site Location: Agricultural Machinery Center Kamphangsaen, Kasetsart University, Nakornpathom.

4. Time for Delivery: Within 30 days

5. Payment

The payment to the seller shall be made within 15 days after the date of acceptance.

6. Guaranty for the equipment: for 1 year

7. Integration

The Seller and the Buyer agree that this Contract, including the Contract Document, expresses all of the agreement, understanding, promises, and convenience of the parties, and that it integrates, combines, and supersedes all prior and

cont....

contemporaneous negotiations understanding, and agreements, whether written or oral, and that no modification or alteration of this Contract shall be valid or binding on either party, unless expressos in writing and executed with the same formality as this Contract, except as may otherwise be specifically provided in this Contract.

8. Jurisdiction

The proper law governing this Contract shall be the law in force in the Kingdom of Thailand.

9. Counterparts

This Contract is executed in duplicate, one for the Seller and on for the Buyer. The Contract shall become effective on the date of signing the Contract.

Seller .....
Mr. Charo Tantisewi
Manager
for United Water Well Construction Ltd.,Part.

Buyer .....
Mr. Akira Kasai
JICA Representative.

予定価格調書

金　$86,000　バーツ

件　名　カセサート大学農業機械化プロジェクトに係る現地調達機材の購入

上記のとおり決定する。

昭和59年2月3日

国際協力事業団

契約担当役

バンコック事務所

所長　　到　西　　明　　印

予定価格下調書

金 ¥85,000 バーツ

件 名 カセサート大学農業機械化プロジェクトに係る現地調達機材の購入

上記のとおり仮契しました。

内訳は、別紙予定価格下調内訳書のとおりです。

昭和49年2月3日

国際協力事業団

バンコック海外事務所

菊地文夫

ESTIMATE

STI SIAM TRADING & INVESTM
G.P.O. BOX 1364 BANGKOK
CABLE SIAMTRAIN

Messrs. JICA Bangkok Office
Bangkok

Date January 5,

(No. EMA2-3217)

Reference :

Delivery : Not Later than May 15, 1984

Payment : Cash on delivery

Weight: Net ..... Gross ..... Measurement : .....

Item	Quantity	Description	price	
		KUBOTA Submersible pump system		
1	1 set	Pump Model : BSM8010FK.(0.65m^3/min.) with cable, base plate, vent pipe, air valve, compound gage, bolt and nut, water level detector, cable band		1
2	1 set	Valve, 80Ø Sluice valve ... 1 piece 80Ø Check valve ... 1 piece 100Ø Sluice pipe ... 1 piece		1
3	1 set	Piping for pump system Rising pipe 2.75m x 80Ø 32 pcs with bolts and nuts, packing and piping materials		1
4.	1 set	Pressure Tank 1 m^3, Vertical type made of steel		1
5	1 set	Electric control panel, out-door self standing type		1
		Total		1

REMARKS:

1. Delivery Point : Kasetsart Univ. Kamphangsan Agric. Machinery Center
2. Installation charges are not included
3. Validity of estimate : February 15, 1984.

SIAM TRADING & INVESTMENT CO., LTD.

A. ONOZAWA
P.P. Manager Machinery Dept.

E. & O. E.

บริษัท เอ็กมี่ จำกัด ACME COMPANY LIMITED

158/20-21 PHETCHBURI RD. PHAYATHAI BANGKOK THAILAND TELEX 72269 ACME TH
158/20-21 ถนนเพชรบุรี เขตพญาไท(ทิ่งพญา) กรุงเทพมหานคร ☎ 252-3130-5

ใบเสนอราคา
QUOTATION

เลขที่ OUR REF. ACQ84021/SB/SP

ชื่อ CUSTOMER Messrs. JICA Bangkok Office

อ้างถึง YOUR REF. -

วันที่ DATE JANUARY 10, 1984

บริษัทฯ มีความยินดีเรียนเสนอราคาสินค้าตามรายการและข้อกำหนดดังต่อไปนี้:--
WE ARE PLEASED TO OFFER YOU THE FOLLOWING COMMODITIES UNDER THE TERMS AND CONDITIONS NOTED HERE BELOW:

ลำดับ ITEM	รายการ DESCRIPTION	จำนวน QUANTITY	ราคาต่อหน่วย UNIT PRICE	จำนวนเงิน AMOUNT
1.	SUBMERSIBLE PUMP MODEL : 80 EHS (0.65M^3/m) ACCESSORIES : CABLE WELL COVER DISCHARGE ELBOW AIR VENT VALVE COMPOUND GAUGE BOLTS AND NUTS ELECTROD FOR WATER LEVEL-DETECTION CABLE CLIPS	1 SET	236,000.-	236,000.-
2.	VALVE : 80 SLUICE VALVE 1 pc 80 CHECK VALVE 1 pc 100 SLUICE VALVE 1 pc	1 SET	21,000.-	21,000.-
3.	PIPING FOR PUMP SYSTEM : RISING PIPE 2.75mx80mmx32pcs WITH BOLTS,NUTS,PACKING AND PIPING MATERIALS	1 SET	140,000.-	140,000.-
4.	PRESSURE TANK: CAPACITY - 1m3 TYPE - VERTICAL MATERIAL - STEEL	1 SET	94,000.-	94,000.-
5.	CONTROL PANEL: TYPE - OUTDOOR USE AND STANDING	1 SET	156,000.-	156,000.-
			TOTAL	647,000.-
	(BAHT : SIX HUNDRED FORTY SEVEN THOUSAND ONLY)			

กำหนดชำระเงิน
TERMS OF PAYMENT: CASH ON DELIVERY

กำหนดยืนราคา
PRICE VALIDITY : 30 DAYS

กำหนดส่งของ MAY 30, 1984
TIME OF DELIVERY : KASETSART UNIVERSITY KAMPENGSAEN AGRICULTURAL MACHINERY CENTER

หมายเหตุ
REMARKS: -

บริษัทฯ ขอขอบคุณที่ได้มีโอกาสเสนอราคาให้ท่าน และหวังว่าคงจะได้รับการพิจารณาสั่งซื้อจากท่านในเร็ววันนี้
WE THANK YOU FOR GIVING US THE OPPORTUNITY TO QUOTE, AND HOPE THAT YOU WILL FIND OUR FOREGOING OFFER ACCEPTABLE.
WE LOOK FORWARD TO RECEIVING YOUR VALUED ORDER WHICH WILL BE PROMPTLY ATTENDED TO AND HIGHLY APPRECIATED.

บริษัท เอ็กมี่ จำกัด
ACME CO., LTD.

(SUPPACHAI BORWORNWATKUL)
SALES MANAGER

หรือ หรือ เทียบ E. & O. E.

CONTRACT

FOR SUPPLY AND DELIVERY OF LOCAL PROCUREMENT

(Submersible Pump System)

This Contract is executed and delivered this February , 1984 between

Siam Trading & Investment Co.,Ltd.
Dusit Thani Office Building, No.946 Rama IV Road, Bangkok

represented by Mr. Nagayuki Takase, President and herein called "Seller" and

Japan International Cooperation Agency (JICA)
Bangkok Office, C/O Embassy of Japan, Bangkok

represented by Mr. Akira Kasai, The Resident Representative and herein called "Buyer"

The Seller and the Buyer mutually agrees as follows:

1. Contract Documents
The following documents are attached to this Contract and are incorporated and made a part of this Contract, as though fully written out and set forth herein: Seller's ESTIMATE NO.EMA2-3217 dated January 5, 1984.

2. Agreement for sale
The Seller agrees to sell, and the Buyer agrees to buy the submersible pump system as are described in the Contract documents Total amount Baht 585,000.- (Five hundred eighty five thousand bahts only)

3. Delivery Site Location: Agricultural Machinery Center Kamphangsan, Kasetsart University, Nakornpathom.

4. Time for Delivery: Not later than May 15, 1984.

5. Payment
The payments to the Seller shall be made within 15 days after the date of acceptance.

6. Guaranty for the equipment: for 1 year

cont...P2

7. Integration

The Seller and the Buyer agree that this Contract, including the Contract Document, expresses all of the agreement, understanding, Promises, and convinience of the parties, and that it integrates, combines, and supersedes all prior and contemporaneous negotiations understanding, and agreements, whether written or oral, and that no modification or alteration of this Contract shall be valid or binding on either party, unless expressed in writing and executed with the same formality as this Contract, except as may otherwise be specifically provided in this Contract.

8. Jurisdiction

The proper law governing this Contract shall be the law in force in the Kindom of Thailand.

9. Counterparts

This Contract is executed in duplicate, one for the Seller and one for the Buyer. The Contract shall become effective on the date of signing the Contract.

Seller:

Mr. Nagayuki Takase
President
Siam Trading & Investment Co.,Ltd.

Buyer:

Mr. Akira Kasai
JICA Representative.

TIMATE

G.P.O. BOX 1364 BANGKOK, THAILAND
CABLE SIAMTRAIN BANGKOK

Messrs. JICA Bangkok Office
Bangkok

Date January 5, 1984

(No. EMA2-3217)

ference :
livery : Not Later than May 15, 1984
yment : Cash on delivery
ight: Net ..... Gross ..... Measurement :

Quantity	Description	price	amount
	KUBOTA Submersible pump system		
1 set	Pump Model : BSM8010FK (0.65m³/min.) with cable, base plate, vent pipe, air valve, compound gage, bolt and nut, water level detector, cable band		¥ 210,000.
1 set	Valve, 80Ø Sluice valve ... 1 piece 80Ø Check valve ... 1 piece 100Ø Sluice pipe ... 1 piece		¥ 19,000.
1 set	Piping for pump system Rising pipe 2.75m x 80Ø 32 pcs with bolts and nuts, packing and piping materials		¥ 133,000.
1 set	Pressure Tank 1 m³, Vertical type made of steel		¥ 82,000.
1 set	Electric control panel, out-door self standing type		¥ 141,000.
	Total		¥ 585,000.

REMARKS:

1. Delivery Point : Kasetsart Univ. Kamphangsan Agricultural Machinery Center
2. Installation charges are not included
3. Validity of estimate : February 15, 1984.

SIAM TRADING & INVESTMENT CO., LTD.

A. ONOTAYA
P.P. Manager Machinery Dept.

E. & O. E.

บริษัท ช. สัมพันธ์โลหะกิจ จำกัด
建發有限公司
CHOR SAMPAN COMPANY LIMITED
เลขที่ 60 ซอยสุกร 1 ถนนเจ้าพระยา แขวงคลองเตย เขตสัมพันธวงศ์ กรุงเทพมหานคร
☎ 2343394, 2243396

1 FEBRUARY 1984

JAPAN INTERNATIONAL

COOPERATION AGENCY

JAPAN

GENTLEMEN,

We are proud offer you the equipments using in plumbing as following 59 lengths

59 set	(350) G.S.P	pipe	4" / 6 m	785/6 m	46,315.-	baht
41 "	(246) "	"	3" / 6 m	554/6 m	22,714.-	"
9 "	dboe "	"	4" / 90°	275 baht	2,475.-	"
3 "	" "	"	3" / 90°	180 "	540.-	"
8 "	tee "	"	4" / 3"	340 "	2,720.-	"
5 "	gatebalve(KITZ) "		3" / 125 p	1,850 "	9,250.-	"
10 "	omega clamp "		4"	170.10 "	1,701.-	"
			Miscellaneous materials		9,285	"
			Totol		95,000	"

Hope to service you in this good opportunity

Youre truly

Vichai sitlhrun chrm

(Manager and director)

194/7 ถนนลาดพร้าว
บางเขน กรุงเทพฯ
โทร. 511-2587
511-4841

ห้างหุ้นส่วนจำกัด
ทวีธรรมเอ็นยิเนียริ่ง
THAWEETHAM ENGINEERING
LIMITED PARTNERSHIP

194/7 Lardprao Road,
Bangken, Bangkok.
Tel. 511-2587
511-4841

ใบเสนอราคา
QUOTATION

เลขที่ 110
NO.

วันที่ February 1 , 1984
Date

บริษัท
Messrs : JAPAN INTERNATIONAL COOPERATION AGENCY

เรียน ผู้จัดการ ทั้งหลาย
Dear Sirs,

ห้างฯ มีความยินดี ขอเสนอราคา ค่าวัสดุและค่าแรง
We are pleasure to offer the estimate of materials & labour cost

สำหรับงาน K.U. IRRIGATION WORK ที่ BANGKOK
for ..... at .....

ตามรายการข้างล่างนี้
domitory as following description :

ลำดับ Item	รายการ Description	จำนวน Quantity	หน่วยละ Unit Price	จำนวนเงิน Amount
	G.S.P. Pipe 4"x6m	59	800 -	47,200
	" 3"x6m	41	600 -	24,600
	Elbow 4"x90°	9	300 -	2,700
	" 3"x90°	3	220 -	660
	T reducer 4"x3"	8	400 -	3,200
	Gate valve bronze 3"x125lb	5	2,000 -	10,000
	Omega 4"	10	200 -	2,000
	Misc. material			10,000
	Total			100,360

THAWEETHAM ENGINEERING LTD., PART.

ผู้จัดการ Manager

ห้างหุ้นส่วนจำกัด บุญชัยการช่าง
BOONCHAI ENGINEERING LTD., PART.
400 Soi Panichanan, Sukhumvit 71 (Klonglon), Bangkok, Thailand.
๔๐๐ ซอยพานิชอนันท์ สุขุมวิท ๗๑ คลองตัน พระโขนง กรุงเทพมหานคร ☎ 392-5306, 392-5459

No B/005

February 1, 1984.

Japan International -
Cooperation Agency

Re: Quotation for supply galvanized steel pipes and fittings.

Gentlemen:

We have please to submit heve with our quotation for supply galvanized steel pipes and fittings as per our details below:-

1. ø 4"/6.00m. O.S pipe Class medium	59	EA.	@ 1,000.-	= 59,000.-
2. ø 3"/6.00 m. " "	41	"	@ 850.-	= 34,850.-
3. ø 4" Elbow'00'	9	"	@ 200.-	= 1,800.-
4. ø 3' " 90'	3	"	@ 150.-	= 450.-
5. ø 4"/3" Tee	8	"	@ 300.-	= 2,400.-
6. ø 3" Gate Valve 125 PSI	5	"	@ 1,750.-	= 8,750.-
7. ø 4" Omega Clasp	10	"	@ 250	= 2,500.-
8. Elec Material	LS.			= 10,000.-
	Total Cost		ø	= 119,750.-

(Baht, One hundred nineteen thousand seven hundred and fifty only)

Conequently, if our qustation is accepted by you, we would ask you to reply and have a order Sheet to us, in order that we may proceed the material in hand, Thank you.

Very truly yours,
BOONCHAI ENGINEERING LTD., PART.

Valin Sewhautichai

for Boonchai Leewatanarong
Manager.