インドネシア国道路建設用機械の現況調査およびWork Shopの整備計画のための調査団の報告書

田　原　保　二
窪　田　　進

昭和45年3月

海外技術協力事業団

目　　次

Construction Industry, Dept of Public Works and Power, 1968.

別添資料 4.〕Indonesia の Highway Project に関
〃　　5.〕する世銀，I. D. A. の報告書の写.

§1. Indonesia政府の要請と第一次派遣調査団との関係

本件に関しては去る昭和44年2月 Application Form A1 により Indonesia政府（Ministry of Public Works and Power 所管）より要請があり，日本政府としては建設省の推薦に基づき，海外技術協力事業団の委嘱する下記の専門家が第一次要員として，昭和44年9月25日から仝年10月22日まで現地に派遣され，主として日本の賠償による道路建設用機械の現地での実状把握とこれが要修理程度ならびに修理用部品の補充計画，Work Shop の整備計画に対する調査，助言を行なうことゝなった。

第一次要員氏名

団長	川崎迪一
団員	高井照治
〃	浅野茂夫
〃	沢田茂良

次いで海外技術協力事業団は建設省に対し昭和44年10月3日かねて照会中の下記の2名が第二次要員としてIndonesia 政府から追加受入れが確認されたる旨を通知する一方，建設省も同日付を以てこれらの2名を正式に推せんし，よって第二次要員の両名は昭和44年10月15日から仝年11月4日まで3週間，若干の日数を現地で第一次要員と重複させながら現地に派遣されることゝなった。

第二次要員の任務は，先の第一次要員の調査結果に基づいて，同要員が作成した報告書案に対し，適切な助言と口授を与えると共に，これら報告書の主旨をIndonesia政府当局に対して，在Indonesia 日本大使館関係者と協力して出来得るだけ衆知徹底させ，特にWork Shop の整備計画とその運営方法に関しては世界銀行関係者，同関係Consultant とも会談して，わが方の意図する処を説明し，可能なる限りにおいてこれが実現に協力と了承を求めることにあった。

なお附随して今後におけるIndonesia の道路，橋梁の建設計画に関する

正確なる情報と見通し，将来日本側としてこれに協力し得る分野とその可能性等の打診を試みることも期待された。

第二次要員氏名

田　原　保　二

窪　田　　進

以上の様な過程によって第一，第二両次調査要員が派遣されたが，第一次派遣要員の報告は既に提出ずみであり，こゝでは後の第二次派遣要員の報告にとゞめる。

したがって本報告書の吟味に当っては，予め第一次要員の報告書を参照されんことをお願い致したい。

§ 2. 道路建設用機械の現況調査と修理用補充部品の決定ならびにWork Shopの整備計画に関する事項

1. 第一次調査団との協力作業

10月20日（月）　日本大使館において

大使館関係　笹沼充弘書記官，山本淳二建設技官

調査団側では

第一次調査団，団長　川崎迪一　建設技官

高井照治　〃

浅野茂夫　〃

沢田茂良　〃

第二次調査団，　田原保二

窪田　進　建設技官

の全員が参集し，第一次調査団がまとめた原案を中心に，中間報告書の検討を行ない，午後一応和文による成案を得て，直ちに英文翻訳係に廻付した。

翌10月21日（火）再び大使館において朝9時より全員会合し，前記英文による中間報告書の内容を再確認した。

午前10時半，日本大使館側，笹沼充弘書記官および調査団全員が，Indonesia政府，公共事業省道路総局（BINAMARGA, Ministry of Public Works and Power）を訪問，下記政府関係者と会合し，団長川崎迪一建設技官より，Sarsono氏に対して中間報告書を手交し，全文を読み上げて報告を終った。

道路総局長（Director General of BINAMARGA）

BRIG GJEN. Sarsono.

総合計画局長（Director of PERENTJANAAN）

IR. Kwee Hway Sian

資材購入局長（Director of PERALATAN and PERBEKALAN）

IR. Sunarjo

他資材購入局関係局員，道路総局長秘書官出席。

報告終了後Indonesia政府側より謝辞があり，ついで日本側笹沼書記官より報告書の内容全般について，特に賠償による部品の補充計画と賠償によらざるものとの区分について，説明確認すると共に，Work Shopの整備計画に対する日本側の協力について意志表示を行ない，又田原保二団員より，報告書の最終項目，すなわち12. The necessity of Future technical guidance について発言を求め，日本側としては資材の供給に止らず，Work Shopの運営と関連して，これら要修理機械の修理や維持のために日本の適切な技術援助が必要かつ重要と考えられる点を指摘した。

なお，田原保二団員は会合終了後公共事業省次官（Secretary General of Ministry of Public Works and Power,）

BRIG GJEN. Dandi

に笹沼書記官と共に会見挨拶した。

１２時半よりIndonesia政府側の招待により笹沼書記官と調査団全員に対し迎賓館において昼食会が催された。

2. 世界銀行 Mr. Alfred Matterとの会談

１０月29日（水）午前9時 Indonesia政府企画庁（BAPPENAS）を大使館笹沼書記官と共に田原団員が訪問，特に世界銀行より派遣されているProject Engineer for Transport, Mr. Alfred Matterに面会し，今回の我々の調査の結果について大要を説明すると共に，Work Shopの今後の運営については，何等かの形で日本側の技術的関与が必要なることを力説し，世銀としてもこれに同意協力されたき様要望した。

これに対しMr. Alfred Matterは好意ある賛意を示すと共に，日本の建設機械に関する限りにおいて，修理用部品の供給その他のための予算として，日本に対しては近々世銀予算枠内から約２００万弗を割当てる用意あることを表明した。

又日本側の言う技術的関与の内容の点に触れ，道路技術者を含む，道路用建設機械技術者せいぜい３～５名程度の協力で十分であろうと示唆した。

又その節Mr. Matterより特に部外㊙として別添資料－7,8を受領した。

3. KAMPSAX, Mr. Johs N. Bredahlとの会談

１０月28日（火）午前１０時 BINAMARGAを大使館笹沼書記官と田原団員が訪問，BINAMARGAの中にあるForeign Consultant, KAMPSAXに同社Project manager Mr. Johs N. Bredahlを訪ね同社が現在BINAMARGAを中心にIndonesia政府に対して契約実施中の1968～1970 Highway Services and Transport Coordination Advisory Servicesなるconsulting Servicesに関連し，その一部として当然包含される下記のProjects,

a) Pilot training and experimental program for all

phases of highway work.

b) Implementation of inventory and costing technignes, and technical assistance to support these operations.

すなわち，修理用部品の補充に関する全般計画，その実施予算の策定およびこれを実施するためのWork Shopの整備計画とその運営方法に対する技術援助，更にはこれら道路用建設機械を使用しての維持補修工事から改良，新設工事に至る各段階に対する技術訓練と試行計画の策定などと今回日本側で実施した建設用機械の現況調査と補修用部品の充足計画ならびにWork Shopに関する技術的助言との関係について討議，懇談し，特にWork Shopの運営については，日本の建設用機械に関する限り，日本側の技術援助が何等かの方法によって協力されることが望ましいことを進言した。これに対してMr. Johs N. Bredahl も KAMPSAX としても必要あれば是非日本側との協同作業を期待すると述べた。たゞしMr. Alfred Matterの意見と同様，協力を要するとしてもせいぜい5名程度の専門技術者で足りるだろうと付言した。

4. BINAMARGA, Mr. Kwee Hway Sianとの会談

10月31日（金）BINAMARGAにDiractor General, Mr. Sarsonoを訪問面談約束のところ，10月28日 Bogor近郊の国道橋の落橋事故のため，同氏は急きょ現地に急行，復旧工事指揮に当ったため，遂に面談出来ず，代って総合計画局長のMr. Kwee Kway Sian と会談，前記3. および4項の主旨と同様の申し入れを行ない，Project 全般が無理なく，円滑に進捗する様に希望すると共に，今回滞在中のIndonesia側の示した好意に対し感謝の辞を述べた。

これに対してMr. Kwee Kway Sianは日本側の立場とその様な必要性についても十分理解出来るが，現在の既成事実は当然これを尊重し，世界銀行の調査報告と同Consultant KAMPSAX，およびLouis Berger

の意見を尊重しつゝ計画の実施を計りたいので，日本としてもその線で協力を望みたい旨の希望があった。

又日本の道路関係Consultantとしては，今後世界銀行に対して，より積極的な接近の努力が必要で，世界的水準のConsultant としての訓練にまだまだ欠くるところがある様に懸念するので，この点を急速に改善されることを望む様な意味の発言があった。

§ 3. Indonesiaの道路，橋梁分野における今後の日本の技術協力，企業協力のあり方に関する事項

たまたま今般建設機械関係の用件で彼地に滞在中，政府関係者とIndonesiaにおける道路，橋梁の現状と将来について諸々の話題が相互に交換され，その中でも下記の２つの場合は，これを一括して十分考慮に価するものであり，実施も可能なものと判断してこゝに報告するものである。

したがって本件に関しては日本側関係機関においても早急に検討を行ない，明年度よりのIndonesia側からの要請に対して，直ちに受けて立ち得る態勢を固めておくことが是非必要であると痛感する。

1. State Contractors and Consulting Engineersの理事長 IR. S. Danunagoroとの会談

State Contractors and Consulting Engineersなる機構は元元Indonesia独立以前に諸外国が民営でIndonesia国内で経営して居た建設工事会社，設計事務所の類を，同国の独立とともに国が接収し，一応下記の主なる１３社を一つに纒めて，公共事業省の外局的存在の国営建設法人とし，国内での建設工事のほとんど全部がこの機関によって施工されている実状である。

中でも一般土木工事については下記１３社中Hutama Karya が最強力

で，橋梁鉄骨関係では比較的大きな代表的なものとしてAmarta Karyaが挙げられる。別添資料－4，5参照。

13社の名称

P. N. Adhi Karya

P. N. Amarta Karya

P. N. Bina Karya

P. N. Buana Karya

P. N. Hutama Karya

P. N. Indah Karya

P. N. Yodya Karya

P. N. Kumala Karya

P. N. Nindya Karya

P. N. Pembangunan Perumahan

P. N. Virama Karya

P. N. Waskita Karya

P. N. Widjaja Karya

10月29日（水）上記機関の代表者たる理事長（Ist Executive Chairman, Board of Directors）IR. S. Danunagorsに面接。同行者　大使館笹沼書記官。

その節同氏は現在の国営建設法人の機構を明年度より逐次改善し1973年度を第一次目標に，1978年度を最終期限として，Ministry of Public Works and Power からPEMBINAAN Construction Industryの構想を実現させたい旨発言した。この構想は，現在および当分の間その活動を必要とされるForeign Consultant, Foreign Contractor の政府直接契約方式を逐次改め先進国の技術援助と経済援助を期待しつゝ国内の現機関の実力の向上を計り，最終的には極めて理想的な形で Construction Industryが自体性を握りながら，諸外国の技

術力を活用するという考え方である。
別添資料－6参照。

以上の政策はもちろんIndonesia政府自体の政策でもある。

又IR. S. Danunagors氏はこの様な政策を遂行する過程において，明年度より日本からの強力な技術援助を期待すると述べ，特に橋梁の分野に関しては，田原団員が橋梁専門家であることを熟知して，Indonesiaにおける道路橋の設計と標準化，新技術の採用と訓練既存，橋梁鉄骨工場の設備改善計画の立案とその実施，Prestressed Concreteの積極的利用方法とその研究などIndonesiaの橋梁技術の近代化に大いなる努力をもって前向きの姿勢で対処したい意向を示し，そのためには例えば第一次の段階としてColombo Plan等による政府間baseによって日本の技術者を招聘したり又適当なIndonesiaの技術者を日本に派遣させるなどの方法により，主として技術援助を中心とした両国の交流を計り，ある時点から，必要に応じて，これらの結果を更に有効に結実させるために部門ごとの，例えば橋梁鉄骨製作，架設の工事部門の如く，企業単位での民間baseの協力に進展させるために是非日本側の善意ある理解と協力を得たい旨力説した。

これに対し田原団員より，主旨としては全く異議はないので，明年度よりこの様なことでIndonesia側の要請があった場合，円滑に話が進む様，あらかじめ日本の関係機関にも伝達，努力する様回答した。

更に10月29日夕刻，宿舎にHutama Karyaの Managing Director IR. H. A. Omarの来訪を受け，上記と同様の意味の懇請があった。

翌10月30日（木）11時半より田原，窪田両団員は再びBINAMARGAに於て Mr. Danunagorsと会見。Hutama Karyaより出席予定の前記IR. H. A. B. Omarとdrs. Jahja Budidharma は急用のため出席出来なかったが，Amarta KaryaよりManaging DirectorのBambang WaskitsとTechnical Managerの IR. A. B. Siregar の両氏が列

席し，昨日と同様の意見に対して，席上今後具体的にどの様な問題から取り上げて行くか又日本側に要請することについてIndonesia側内部での意見調整を，明年3月末を目標に押し進めるとMr. Danunagorsより発言があった。

2. Prof, IR. R. Roosseno との会談

Djakartaに滞在中，Indonesiaにおける Concrete 工学の大家であり，元Bandung工科大学の教授でもあり，現在は上記国営建設法人のいくつかのKaryaにも関係しているProf, IR. R. Roosseno と田原団員のみで2回に亘り会談した。

同氏の場合においても，例えばPrestressed Concreto の標準設計，Block工法などの新技術について，Mr. Danunagoro と同様，何等かの方法で日本の技術協力，企業協力が得られることが望ましいとの意見であった。

これに対し田原団員も賛意を述べ，例えば取敢ずColombo Plan による技術援助の方法によって相互に研究することが好ましいのではないかと示唆した。

§ 4. Indonesiaにおける Foreign Consultant との協力に関する事項

Indonesiaにおける BAPPENAS を中心とした開発5カ年計画の立案は，世界銀行の下で行なわれる諸々の調査に基づいて，BAPPENAS自身と世界銀行の推薦によって選ばれかつIndonesia 政府との契約を行なっているといわゆるForeign Consultantの協力によって決定される。

別添資料－7，8のRestricted Report㊙は1969年6月に世界銀行でまとめたIndonesiaの道路建設5カ年計画に関する報告書であるが，本報告はもちろん，現在Foreign Consultant として活躍中のKAMPSAX

and Louis Bergerの行なった調査と報告書が基礎となっている。

本報告によればIndonesiaの道路建設事情はこゝ当分の間はもっぱら維持補修で地域的にも重点主義で施工されるであろうが，いづれにしても，近い将来には，道路の改良，改築，更に新設へ移行することは必至であり，特に橋梁の耐荷力は現在10噸以下の車輛の載荷能力のものが殆んどあるから，これらの全面的改築，新築はどうしても避けられず，したがって今後のIndonesiaのHighway Projectは事業量の面においても，技術水準の点においても相当多大かつ高度なものになるに違いないと判断される。

たゞしこの様なProjectの遂行には特に世界銀行よりの資金，各国の援助資金，あるいはADBからの資金を必要とするであろうから，Projectの実施計画も亦，この種の資金の調達計画に制約されるであろう。

上記のKAMPSAX, Louis Bergerは今の処，当初の5カ年計画に関する，いわゆるProject MakerとしてのPlanningを行なって居るに過ぎず，これが今後数年を出でずして開始されるであろう，道路，橋梁の改築，新築に伴なう大量の設計，監理の実務までを全面的に担当出来得るかどうか，又その様な用意があるか否かに問題がある。

10月28日（火）田原団員は大使館笹沼書記官と共にKAMPSAXの事務所を訪れ，同社Project Manager Mr. John N. Bredahlと会った節に，この点についての話題に触れ，結局KAMPSAXとしても，今後事業の進展に伴なって予想される，この様な懸念に対しては，ある技術分野，たとえば橋梁の設計とか監理とか言った部分について，日本の然るべきConsultantの協力を得られることがむしろ望ましいことであると表明した。

このことは田原団員が同日午後たまたまDjakartaを訪問旅行中のCopenhagenにある同社の本社Managing Director Mr. Erik NorskとMr. Bredahlを交えてHotel Indonesiaで会談した節にも確認され，取敢ず日本の代表的な橋梁専門のConsultant又はそのGroup と

KAMPSAX との間で至急連絡がとれる様手配することで両者の合意が成立した。

§ 5. Indonesia における日本の Consultant の活動現況の調査に関する事項

田原，窪田両団員は，今後日本の道路，橋梁関係 Consultant の Indonesia 進出を予測し，その参考に資するため在 Djakarta の日本工営 Djakarta 事務所を尋ね，新井清保所長，小柴勝副所長等から実情を聴取すると共に，10月24日（金）から10月27日（月）の間，休日を利用して下記の現場を巡回した。又これらの現場を廻るに当って途中 Bandung に立寄り，目下同地水理研究所において Colombo Plan により派遣勤務中の建設技官谷本修志氏を訪問し，同研究所を視察すると共に，中部 Java の現場にも同氏の同行を願い，旅行のために少なからざる便宜と協力を得た。

巡回見学した現場名

日本工営関係　　Sempor Dam.

三祐 Consultant 関係　　Tadjum Irrigation Project.

Tadjum Irrigation Project の現場では三祐 Consultant の松居正治，玉置和範両氏の御案内を願った。

§ 6. 結　語

以上を以て第二次要員としての報告を終るが，われわれが今度現地で行なった行動の大半は，本報告の内容を見ても解る様に，Indonesia 政府，BINAMARGA の当事者，世界銀行の関係者およびこれに関係ある Consultant，KAMPSAX の責任者，あるいは Indonesia の建設業界

の指導者との意見の交換であり，いづれの会談に於ても，われわれの考え方に同調的で，好意を以て今後われわれ日本側の協力を歓迎し，又希望する様に見受けられた。

しかし問題はむしろこの様な話し合いを今後如何にして具体的に実現させるか又そのためにどの様なFollow upをつけるかと言うことであり，現地大使館担当者の活躍はもちろん大いに期待したいが，むしろ日本政府ならびに関係機関の自発的な熱意と協力によって，官民一体となって，計画的，組織的な対策を建てることこそ，急務であり，又同時に日本にとっても，Indonesiaにとっても効果的なProjectを選んだことも重要大切なことであろう。

最近発表された対Indonesiaの日本の経済援助はAmerica 合衆国と同じく1億数千万弗に決まるだろうと聞く。

その一部が道路建設の資金として投入される場合，われわれのこの報告書が多少でも物の考え方に，役立つ様念願して稿を閉づるものである。

終りに当って今度の調査のために尽力をし又は終始協力して下さった現地大使館関係者，Indonesia 政府関係者，ならびに在留日本人関係者と，建設省，海外技術協力事業団ならびに国際建設技術協会等に深甚の謝意を表する。

GENERAL CONTRACTOR CIVIL ENGINEERING CONSULTING DESIGN

HUTAMA KARYA

GENERAL CONTRACTING CIVIL ENGINEERING CONSULTING DESIGN

At present one of the largest and most fully equipped construction firms in Indonesia, P.N. (perusahaan negara) HUTAMA KARYA is also one of the oldest. Formerly the Hollandsche Beton Maatschappij N.V. until its takeover by the government in 1958 and its re-establishment as a perusahaan negara (state enterprise) in 1961 it was the subsidiary of a company of the same name in Holland, one of the largest in the country and already having an international reputation.
The Indonesian subsidiary also quickly established itself as one of the leading contractors and obtained a substantial part of the larger construction projects in Indonesia.
Since the achievement of Independence HUTAMA KARYA continued to grow rapidly, as it was increasingly entrusted with the execution of large development projects by the Indonesian government.

In many of the larger works HUTAMA KARYA has cooperated successfully with consultants and specialists from abroad. In this way it has kept abreast with the latest developments in civil engineering and control techniques of large projects. It is the policy of the company to continue such international cooperation to the maximum possible extent in order to improve efficiency.
The first presstressed concrete structure in Indonesia, for example, the Semanggi cloverleaf bridge in Kebayoran, was completed by HUTAMA KARYA in cooperation with the Suisse engi-

neering firm B.B.R, inventors of the B.B.R.V. system of pressing.

As a result of its long and varied experience P.N. HUTAMA KARYA is now staffed with thoroughly competent and seasoned personnel, accustomed to work as a closelyknit team with sophisticated modern equipment under demanding circumstances.

Any construction project, large or small can be undertaken competitively without sacrificing technical requirements, thus giving customers the best value and enduring satisfaction.

SPECIAL ATTENTION

1. Reinforced-, Prestressed-, and Ultimate strength design concrete:

   CLOVERLEAF BRIDGE, DJAKARTA
   TJAWANG BRIDGE, DJAKARTA
   KAIRAGI BRIDGE, MENADO
   MUSI LAND BRIDGE, PALEMBANG
   DOME CONSTRUCTION, MAIN PARLIAMENT BLDG, DJAKARTA
   SEVENTH DAY ADVENTIST CHURCH, DJAKARTA

2. Hydraulic structures and Water ways:

   IRRIGATION CANAL, DJATILUHUR
   IRRIGATION CANAL, CLARA, MAKASAR
   IRRIGATION CANAL, TADJUM, PURWORKERTO
   ROCK FILL DAM, SEMPOR, GOMBONG
   COASTAL RECLAMATION AREA, TUBAN, BALI

3. Highway and Road pavements:

PROJECT AIRPORT BALI, TUBAN, BALI
KEMAJORAN AIRPORT EXTENTION PROJECT, DJAKARTA
KALIMANTAN SUPER HIGHWAY, BANDJARMASIN
DJAKARTA BYPASS, TJAWANG, DJAKARTA
DJAMBI ROAD REHABILITATION, DJAMBI
TJIREBON ROAD REHABILITATION, TJIREBON

ACTIVITIES

1. Residentials:

EXPERT HOUSES, TUBAN, BALI
UNIVERSITY OF INDONESIA RESIDENTIALS, DJAKARTA
MINISTRY RESIDENTIALS, DJAKARTA
PALACE GUEST HOUSE, BOGOR

2. Office and Administrative buildings:

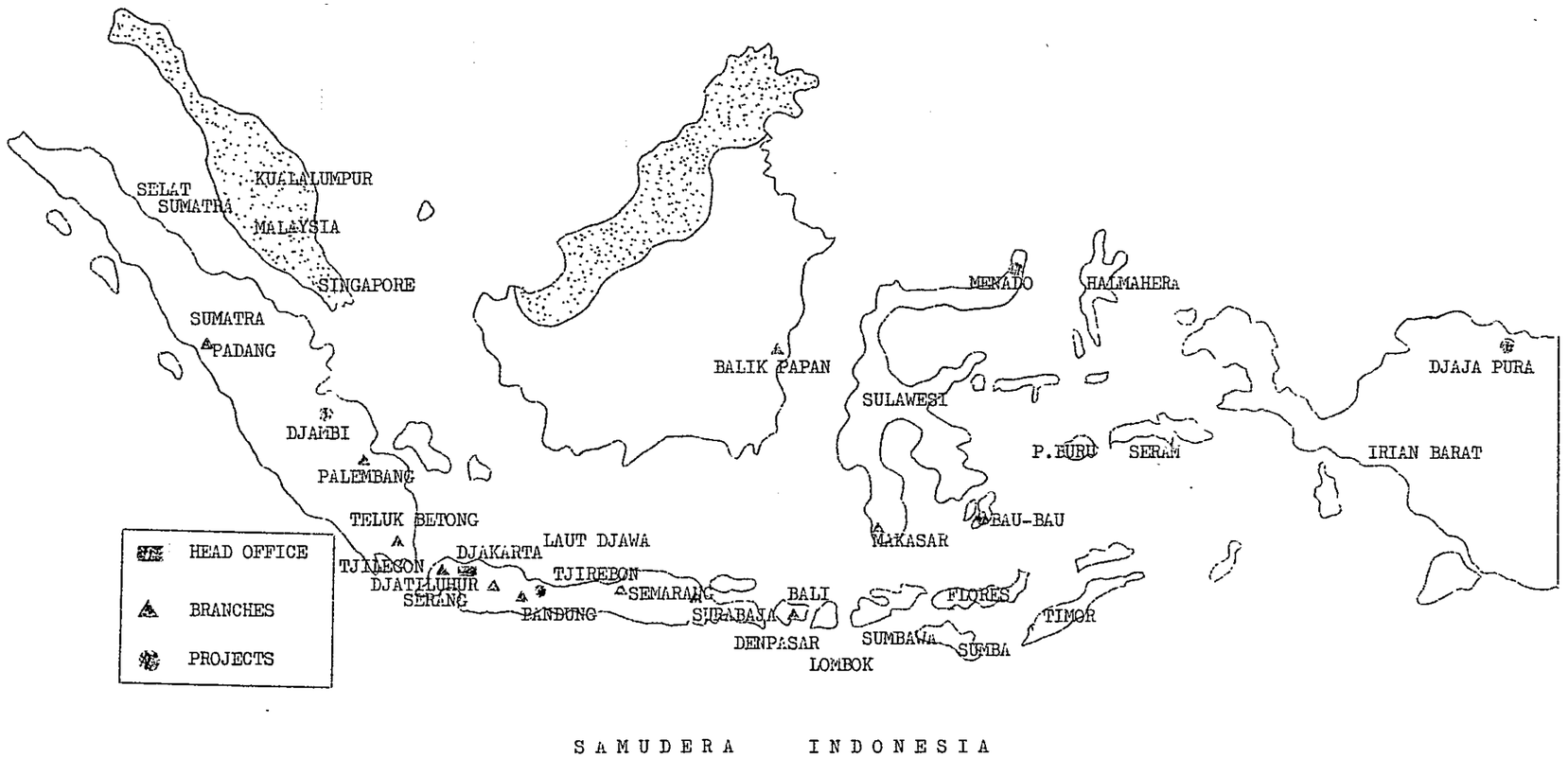
TRADE OFFICE BUILDING, PALEMBANG
EMBASSY OF THE FEDERAL REPUBLIC OF GERMANY, DJAKARTA
APOSTOLIC INTERNUNTIATUR BUILDING, DJAKARTA
PRESTRESSED DOME PARLIAMENT BUILDING, DJAKARTA
PLANETARIUM, DJAKARTA
RADIO TRANSMITTER BUILDING, DJAKARTA
ELECTRO LABORATORY, BANDUNG

3. Industrial manufacturing plant:

CEMENT FACTORY PLANT, TONASA
CEMENT FACTORY PLANT, PADANG
STEEL FACTORY PLANT, TJILEGON
CASTOR OIL PLANT, SEMARANG

KNITTING FACTORY, PALEMBANG

KNITTING FACTORY, DJAKARTA


SELAT SUMATRA
KUALALUMPUR
MALAYSIA
SINGAPORE
SUMATRA
PADANG
DJAMBI
PALEMBANG
TELUK BETONG
TJILEGON
DJAKARTA
LAUT DJAWA
DJATILUHUR
SERANG
TJIREBON
SEMARANG
PANDUNG
SURABAJA
BALI
DENPASAR
LOMBOK
SUMBAWA
FLORES
SUMBA
TIMOR
BALIK PAPAN
MENADO
HALMAHERA
SULAWESI
MAKASAR
BAU-BAU
P.BURU
SERAM
IRIAN BARAT
HEAD OFFICE
BRANCHES
PROJECTS
S A M U D E R A I N D O N E S I A

BRANCHES

DJAWA:

DJAKARTA
11 & 13, Djalan Wolter Monginsidi
Phone: 70521, 70289

BANDUNG
16, Djalan Hadji Hasan
Phone: 8877

SEMARANG
24, Djalan Kepodang
Phone: 895

SURABAIA
20, Djalan Tjomal
Phone: D.6029

KALIMANTAN: BALIKPAPAN
Prodjakal Basiskamp-KM I

SULAWESI: MAKASAR
122, Djalan DR.Sam Ratulangi
Phone: 3004, 3417, 2861

BALI: DENPASAR
219, Ngurah Rai, P.O. Box 219
Phone: 4293

WEST IRIAN: DJAJAPURA
G.K.I. DJL. Koti Balai Pertemuan
Phone: 572-OT. 253 DOG 2

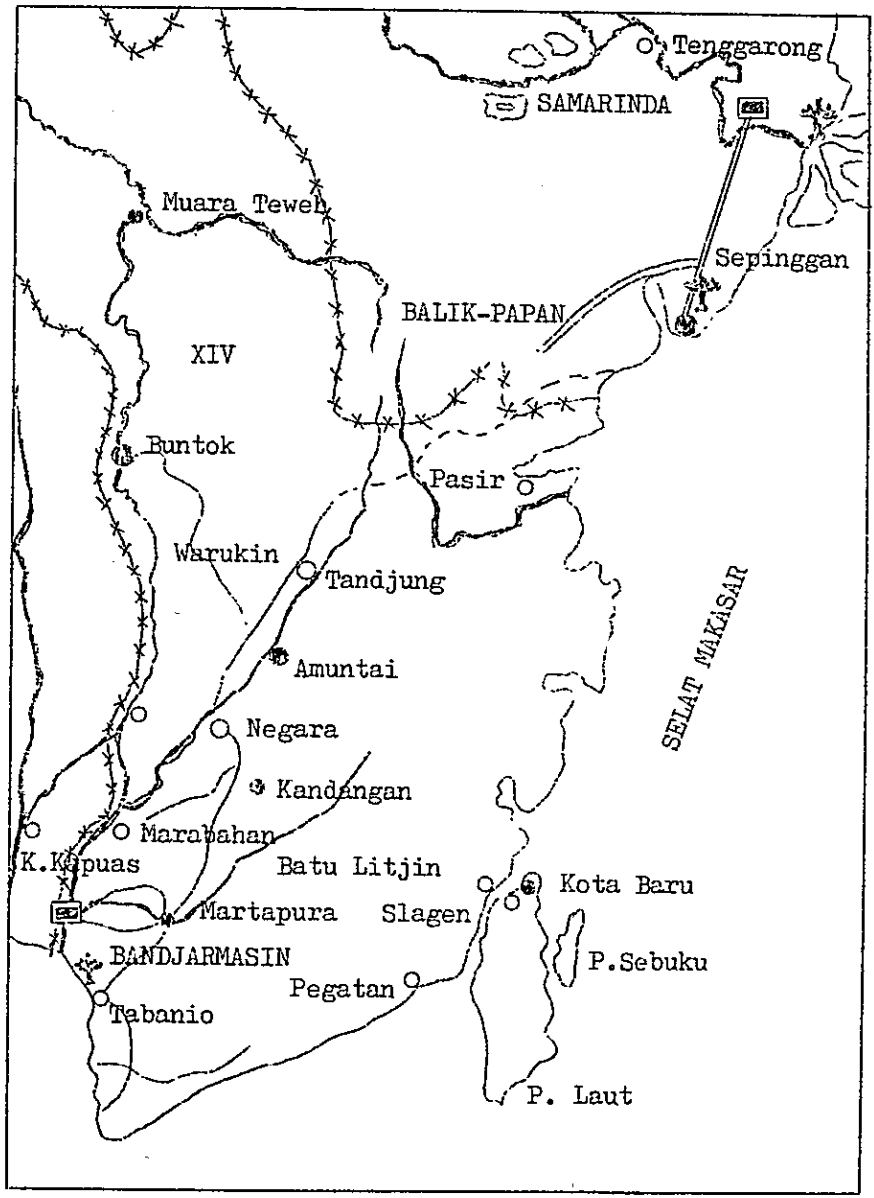
SUMATRA: PADANG
26, Djalan R.A. Kartini
Phone: 22836

DJAMBI
2 Djalan Melati, P.O. Box 60
Phone: 262

PALEMBANG
7, Djalan Kolonel Atmo
Phone: 21442

TANDJUNG KARANG
Complex Perumahan Besi Badja, Pahoman,
P.O. Box 38
Phone: 51908

PART OF TRANS-KALIMANTAN HIGHWAY (BALIKPAPAN-SAMARINDA)



PN AMARTA KARYA

PRODUCTION

- HANGARS
- CONVEYORS
- TANKS
- SLUISES
- BRIDGES
- HIGH TENSION TOWERS
- FACTORY SHEDS
- ANTENNES
- TRIBUNES
- OTHER
  - STEELSTRUCTURES & PLATE WORKS

Perusahaan Bangunan Negara "AMARTA KARYA" didirikan dengan Peraturan Pemerintah R.I. no. 9 tahun 1962 berdasar Undang^2 no. 19 tahun 1960, sebagai Unit Pabrik Konstruksi Badja bekas milik Belanda dahulu Constructie-Werkplaatsen De Vries Robbe-Lindeteves N.V. jang dikenakan nasionalisasi berdasarkan Peraturan Pemerintah R.I. no. 33 tahun 1959, kini berada dalam lingkungan kekuasaan Departemen Pekerdjaan Umum dan Tenaga Listrik.

Pabrik Konstruksi Badja dari P.N. AMARTA KARYA tersebut terletak di Dj. Mpu Tantular no. 38 — 44 Semarang, diatas tanah seluas K.I. 30.800 m^2 jang terdiri atas bangunan^2 Pabrik K.I. 15.900 m^2, gudang^{2}K.I. 3.600m dan lapangan tempat penimbunan K.I. 11.300 m^2 dan mempunjai hubungan zijspoor dengan stasion kereta api.

Pabrik tersebut mempunjai daja kapasitas mengolah pelbagai matjam pekerdjaan^2 konstruksi badja sampai K.I. 4000 ton setahun setjara masimal dan semi-masinal, jang digerakkan oleh tenaga aliran listrik dengan transformator dari 125 KVA atau generator dari 150 KVA dengan dieselagregraat 132 PK; dan mempunjai tjukup tenaga^2

ahli dan — jang berpengalaman.
Lapangan kegiatan-usaha P.N. AMARTA KARYA, jalah: merentjanakan dan melaksanakan pelbagai matjam pekerdiaan^2 konstruksi badja chususnja dan melaksanakan pekerdjaan^2 bangunan sipil umumnja, dalam prospek pembangunan projek^2 anggaran belandja Pemerintah, projek^2 penanaman modal asing dan — domestic, serta projek^2 AID's.

P.B.N. "AMARTA KARYA", an iron and steel construction factory is established as a state enterprise in 1962.

While formerly owned by Vries Robbe — Lindeteves N.V., it is at present operating under supervision of the Department of Public Works and Power.

The factory is located in Semarang, where its complex of buildings, workshops ($\pm$ 16.000 M^2) and storage accomodations ($\pm$ 14.000 M^2) occupies an area of more than 7.5 acres.

Conveniently located not far from Semarang's harbour, the site has a special side-track communicating with the main railroad.

Managed by experienced technical engineers, with a labour force of 350 skilled workers and employeess, the factory specializes in the field of:

— planning
— designing
— assembling &
— execution

of iron and steel construction works.

"Amarta Karya" is able to turn out construction works at an annual capacity of 4.000 ton approximately.

PN AMARTA KARYA

For your orders and
Other transactions

bankers:
Bapindo, B.N.I. 1946,
Bdn.

Head-Office: SEMARANG, Djl. Bandarhardjo Selatan 8 (1st floor),
Phone: Sm. 166, Cable Add.: AMARTA, Postbox 5

Djakarta-Branch: Djl. Hajam Wuruk 127 (1st floor)
Phone: 21401, 21402, 21403/ext. 46,
Cable Add.: AMARTADJAK, Postbox 22

FOR ALL STEEL CONSTRUCTION NEEDS "AMARTA KARYA" SERVES THE FIVE YEAR PLAN

MINISTRY OF PUBLIC WORKS & POWER

No. :Men. 11/10/1. Djakarta, 14 Oktober 1968.
Lampiran :
Parihal :Naskah provisional Kebidjaksanaan Pokok Menteri P.U.T. dibidang Construction Industry dalam rangka Penanaman Modal Asing

Kepada
Jth. Ketua Team Tehnis
Penanaman Modal Asing
di Djakarta. -

Dengan hormat,

Bersama ini kami sampaikan kepada Saudara naskah provisional kebidjaksanaan Pokok Menteri Pekerdjaan Umum dan Tenaga Listrik dibidang Construction Industry dalam rangka Penanaman - Modal Asing, disartai terdjemahannja dalam behasa Inggris.

Sambil mengusahakan penjempurnaannja, naskah ermaksud semen tara dapat dipargunakan sebagai pedoman.

Atas perhatian Saudara kami utjapkan terima kasih.

Menteri Pekerdjaan Umum dan
Tenaga Listrik

Ir. Sutami

KEBIDJAKASANAAN POKOK MENTERI PEKERDJAAN UMUM DAN TENAGA LISTRIK DIBIDANG CONSTRUCTION INDUSTRY DALAM RANGKA PENANAMAN MODAL ASING

PRINCIPAL POLICY IN THE FIELD OF CONSTRUCTION INDUSTRY WITHIN THE FRAMEWORK OF THE FOREIGN INVESTMENT LAW AND FOREIGN CREDITS AVAILABLE (PROVISIONAL)

KEBIDJAKSANAAN POKOK MENTERI PEKERDJAAN UMUM DAN TENAGA LISTRIK DIBIDANG CONSTRUCTION INDUSTRY DALAM RANGKA PENANAMAN MODAL ASING (PROVISIONAL)

PENDAHULUAN

Untuk menarik minat para penanam modal dari luar negeri untuk menanam modalnja di Indonesia, maka Pemerintah Indonesia telah memberikan perangsang-perangsang tertentu a.l. berupa pembebasan dari padjak perseroan atas keuntungan untuk djangka waktu max 5 tahun, dan lain sebagainja. Namun demikian masih dirasa perlu untuk mentjiptakan satu iklim dimana para penanam modal merasa tenteram dengan penanaman modalnja jaitu dengan memberikan kebebasan2 dan kelonggaran2 tertentu pada mereka serta tidak terlalu banjak mengadakan tjampur tangan administratif. Chususnja menjangkut bidang construction industry jang mentjakup surveying, desigining, colsulting dan contracting, jang dalam waktu dekat akan memainkan peranan jang besar dalam memberikan djasa2nja kepada para penanam modal asing diberbagai bidang. Dengan demikian wadjar kalau kepada para penanam modal tsb. diberikan kebebasan untuk menentukan sendiri surveyor, designer, consultant dan contractor mana jang mereka pertjajai untuk melaksanakan projek2 mereka.

Disamping projek2 jang menjangkut penanaman modal asing kita mempunjai djuga projek2 Pemerintah jang dilaksanakan dengan pindjaman dari luar negeri jang berupa project aid dan jang dibiajai dengan Anggaran Negara. Dalam hal ini para pemberi djasa (contractor, consultant d.l.l.) perlu diatur dalam iklim jang baik dalam rangka tugas para pedjabat luar negeri jang

berhubungan dengan project aid tsb.

Dalam kita memberikan perangsang kepada para penanam modal asing berupa kebebasan tertentu dalam menentukan contractor, designer d.l.l. perlu diadakan protectie jang wadjar pada para pengusaha kita sendiri jang bergerak dalam bidang construction industry.

Bahwa perlu dipertimbangkan pula utk memperluas dan meningkatkan pengetahuan teknik, teknologi dan sistim kerdja dikalangan masjarakat umumnja dan dikalangan pengusaha nasional dibidang construction industry chususnja, dengan djalan mendjalin kerdja sama dengan pihak2 luar negeri dalam bentuk2 jang saling menguntungkan.

Kebidjaksanaan2 pokok dibawah ini menjangkut projek2 jang diselenggarakan dalam rangka:

1. Penanaman Modal Asing
2. Anggaran Belandja Negara
3. Project Aids.

I. PENANAMAN MODAL ASING:

1. Foreign investor diizinkan membawa serta contractor dari luar negeri (setelah foreign investor mengadakan tender di luar negeri) untuk mengerdjakan projek2nja dalam wilajah Indonesia sehubungan dengan investasi modalnja.

2. Foreign contractor jang memenangkan tender termaksud ad 1 Pasal I hanja melakukan kegiatan pembangunan jang chusus itu sadja di Indonesia dalam rangka izin jang

telah diberikan oleh Pemerintah Indonesia kepada foreign investor.

3. Dalam hal contractor mengerdjakan pekerdjaan jang ada diwilajah Indonesia menurut ad 2 Pasal I ini, contractor tsb. tidak perlu dan tidak diperkenankan untuk mendirikan badan hukum di Indonesia.

4. Foreign investor jang telah berkedudukan lama di Indonesia (lebih dari 3 tahun) diwadjibkan mengadakan tender (internasional) di Indonesia menurut ketentuan2 jang diatur oleh Menteri Pekerdjaan Umum dan Tenaga Listrik dengan terdapat kesempatan jang sama bagi para contractor Indonesia untuk ikut dalam tender.

5. Setelah project tsb. ditenderkan, baik diluar negeri atau di Indonesia, contractor jang mendapatkan pekerdjaan dari investor mendjadi main contractor. Dalam hal jang demikian contractor tsb. diwadjibkan mengadakan tender taraf kedua untuk menjeleksi subcontractor2 menurut ketentuan2 jang diatur oleh Menteri Pekerdjaan Umum dan Tenaga Listrik.
Dalam tender taraf kedua ini para contractor nasional sadjalah jang diundang termasuk djuga contractor asing jang mengadakan joint-enterprise dengan perusahaan Indonesia.

6. Para investor diberikan bebebasan penuh untuk menundjuk designer, surveyor, consultant jang diingininja sendiri. Dalam hal ini designer, surveyor dan consultant tsb. tidak perlu dan tidak diperkenankan untuk mendirikan badan hukum di Indonesia.

7. Kegiatan jang dilakukan oleh designer, surveyor dan consultant tsb. dalam ad 6 Papasal I hanja melip uti kegiatan pembangunan jang chusus itu sadja, dalam rangka izing jang telah diberikan oleh Pemerintah Indonesia kepada foreign investor.

II. ANGGARAN BELANDJA NEGARA:

Untuk Projek2 jang langsung dibiajai dari Anggaran Belandja Ne-gara, langsung dari dana Pemerintah ataupun dalam bentuk credit, dan projek jang dibiajai oleh Perusahaan2 Negara atau Swasta dalam negeri perlu diadakan pengaturan sebagai berikut:

1. Contractor asing tidak diizinkan setjara langsung mengerdiakan projek2 ini, ter ketjuali dalam joint-venture dengan contractor Indonesia dan memenuhi Pasal IV ad 2.

2. Consultant, surveyor dan designer tidak diizinkan setjara langsung mengerdjakan p-rojek2 dalam bidang ini, terketjuali dengan tjara jang disebut pada Pasal IV-ad 3.

III. PROJECT AID:

Untuk pelaksanaan projek2 Pemerintah dalam bidang prasarana dalam rangka project - aid sebagai pindjaman djangka pandjang, unsur2 luar negeri sangat terasa pengaruhnja. Dalam hal itu perlu ditjiptakan suatu kondisi jang baik seperti dalam hal pe nanaman modal asing, dengan ketentuan2 sebagai berikut:

1. Dalam mengadakan seleksi daripada consultant, surveyor

dan designer asing, pihak luar negeri mengadjukan nama2 kepada Pihak Pemerintah Indonesia jang akan memilih beberapa nama jang diadjukan untuk diseleksi selandjutnja.

2. Untuk mengadakan seleksi contractor asing, maka dalam tahap pertama, jaitu selama 3 tahun pertama, tender tidak perlu diadakan di Indonesia melainkan boleh diluar negeri.
Kalau consultant dan Pemberi Kredit menganggap perlu mengadakan tender di Indonesia maka hal itu sangat diandjurkan.

3. Setelah masa 3 tahun, semua tender diandjurkan diadakan di Indonesia.

4. Dalam hal tender diadakan di Indonesia, maka harus diberikan kesempatan jang sama pada Contractor Indonesia, sungguhpun seleksi dari contractor berada dalam tangan Pemberi Kredit.

5. Setelah projek tersebut ditender, baik diluar negeri maupun di Indonesia, maka contractor jang mendapat pekerdjaan tsb. mendjadi main contractor, dalam hal itu main contractor diwadjibkan memberikan pekerdjaan pada subcontractor2 jang diseleksi diantara contractor2 nasional, termasuk contractor asing jang mengadakan joint-enterprise dengan perusahaan Indonesia.

IV. KETENTUAN2 LAIN:

1. Perusahaan2 asing jang memberikan djasa dalam bidang consulting, surveying, designing dan contracting tidak

termasuk dalam penggolongan perusahaan2 asing jang mengadakan penanaman modal di Indonesia menurut U.U. no. 1 tahun 1967 tentang Penanaman Modal Asing. Mereka ini tidak diperkenankan mengerdjakan projek2 jang dibiajai langsung dari Anggaran Belandja Negara.

2. Pada dasarnja perusahaan2 asing jang memberi djasa dalam bidang contracting diperkenankan mendirikan badan hukum di Indonesia dengan tjara membentuk joint-enterprise dengan pihak pengusaha Indonesia.

3. Pada dasarnja perusahaan2 asing jang memberi djasa dalam bi dang consulting dan designing diizinkan untuk mendirikan badan hukumnja di Indonesia, dengan tjara membentuk joint-enterprise dengan designer dan consultant Indonesia.

M E N T E R I
PEKERDJAAN UMUM DAN TENAGA LISTRIK

APPENDIX-F

POLICY ON CONSTRUCTION INDUSTRY

CONSTRUCTION INDUSTRY

PRESENT SITUATION

A. LOCAL CONSULTANTS & DESIGNERS
* ARCHITECTURE
* CIVIL ENGINEERING
* INSTALLATION & (MECHANICAL, ELECTRICAL, ETC.)
* PLANNING
* SURVEYING

B. LOCAL CONTRACTORS
* GENERAL CIVIL ENGINEERING CONTRACTORS.
IRRIGATIONS, WATER POWER, HARBOUR ETC.
HIGHWAYS, BRIDGES, RAILROADS, ETC
AIRPORTS, AIRWAYS, TUNNELS, OVER-PASSES, ETC.
* GENERAL BUILDING CONTRACTORS.
HOUSING, INDUSTRIAL PLANTS, MULTISTORY BUILDING, ETC.
UTILITY PLANTS, SEWERS, SEWERAGE ETC.
* SPECIALLY CONTRACTORS
ELECTRICAL, MECHANICAL, AIR-CONDITIONING, ETC.
PLUMBING, PRESTRESSING, LIGHTING, LIFT, ETC.

C. BUILDING MATERIALS INDUSTRY
CEMENT, TILE, BRICK, HARDWARE, PIPES, ETC.

TECHNICAL COOPERATION

FOREIGN ENGINEERING CONSULTANTS AND CONTRACTORS TO BE ENGAGED DIRECTLY BY FOREIGN INVESTORS OR PROJECT AID OFFICERS AS : MAIN CONSULTANTS AND MAIN CONTRACTORS.

LOCAL CONTRACTORS TO BE ENGAGED BY FOREIGN ENGINEERING CONTRACTORS AS SUB CONTRACTORS

PROJECTS OF FOREIGN INVESTORS

JOINT VENTURE
BETWEEN FOREIGN CONSULTANTS AND CONTRACTORS WITH LOCAL COUNTERPARTS.

PROJECTS FINANCED THROUGH PROJECT AID

JOINT ENTERPRICE
BETWEEN FOREIGN CONSULTANTS AND CONTRACTORS WITH LOCAL COUNTERPARTS.

PROJECTS FINANCED THROUGH STATE BUDGET

BUILDING MATERIAL INDUSTRY

TECHNOLOGICAL KNOW HOW AND EFFECTIVE MANAGEMENT

FINANCIAL COOPERATION

PRINCIPAL POLICY IN THE FIELD OF CONSTRUCTION INDUSTRY WITHIN THE FRAMEWORK OF THE FOREIGN INVESTMENT LAW AND FOREIGN CREDITS AVAILABLE. (PROVISIONAL)

I. FOREWORD:

To attract foreign capital investment, the Government has provided specific incentives in the form of exemption from corporation tax on profit during a specific period with a maximum period of five years, exemption from dividend tax and so on.

However, the need is still felt to create a more favourable climate for foreign investors with provision of additional facilities and without too much administrative restrictions.

This is the case in the field of construction industry which covers surveying, designing, consulting and contracting, which in the near future will play an important role in the supply of general engineering service to foreign capital investors operating in several sectors.

Hence the Government considers it reasonable that foreign investors be given the freedom of choice in deciding which surveyor, designer, consultant and contractor to use in the implementation of their projects.

Besides direct foreign investment projects, there are also Government projects financed by means of foreign credits (project aid) and/or from the State Budget.

In the case of project aid projects, a favourable and workable condition should be arranged between the contracting and consulting firms and the group of foreign officials affiliated with the project aid.

To promote and increase the degree of technical knowledge, technology and work-system of the Indonesian entrepreneurial society specifically in the field of construction industry however, a reasonable degree of protection to domestic companies has also to be considered.

This can be done by promoting forms of cooperation with foreign counter-partners on a mutual benefit basis.

The follcwing principal policies cover the execution of projects within the framework of:

I. - Foreign Capital Investment.
II. - State Budget Allocation.
III. - (Bilateral) Project Aid.

I.- Foreign Capital Investment.

1. Foreign investors are allowed to bring in foreign contractors to execute their investment projects (after an international tender arrangement).

2. Mentioned permit in ad 1.I. covers only the specific project and does not automatically cover other projects/works.

3. In the case a foreign contractor operates as mentioned in ad 1.I., the foreign contractor need not and is not permitted to apply for setting up a company under the Indonesian Law.

4. Foreign investors with more than 3 (three) years residence in Indonesia are obliged to arrange an (international) tender in Indonesia giving equal opportunity to

local contractors to join the bid.

5. After the tender is held (abroad or in Indonesia) the selected contractor becomes main contractor.
In that case, the contractor is obliged to arrange a second stage tender to select sub-contractors from among local contractors including foreign contractors operating in joint enterprise with an Indonesian counterpart.

6. Foreign investors are also free in selecting designers, surveyors and consultants of their choice. In that case, the designers, surveyors and consultants need not and are not allowed to set up a company under the Indonesian Law.

7. Mentioned permit in ad 6.I. covers only the specific work being as an integral part of the investment project.

II.-State Budget Allocations.

For projects financed directly through the State Budget and projects financed by Government- as well as by local private enterprises sapply the following procedures:

1. Foreign contractors are not allowed to execute directly projects in this category, except operating on a joint enterprise basis with a local counterpart and conforming to the stipulations set forth in ad 2.IV.

2. Foreign consultants, surveyors and designers are not permitted to execute projects belonging in this

category except in the case as mentioned in 3.IV.

III.-Project Aid.

In the execution of Government projects in the field of infrastructure as part of long term credit arrangement and classified as Project Aid, certain foreign aspects are to be considered.

A favourable climate as in the case of foreign capital investment should be promoted according to the following stipulations:

1. In the selection of consultants, surveyors and designers, the creditor forwards a list of firms to the Indonesian Government, which after reviewing the list will select accordingly.

2. In selecting contractors, during the first phase consisting of the first 3 (three) years, the tender need not be held in Indonesia, except the creditor and the consultant wish otherwise.

3. After the first 3 (three) years, all tender should be held held in Indonesia.

4. In case the tender be arranged in Indonesia, equal opportunity should be given to Indonesian contractors; although the selection of contractors is entrusted in the hands of the creditor (country).

5. After the tender has been held either abroad or in Indonesia, the selected contractor becomes main contractor. In that case, mentioned main contractor is

obliged to select sub-contractors from among local contractors including foreign firms in joint enterprise with an Indonesia partner.

IV.-Other Stipulations.

1. Foreign firms supplying general engineering services in the field of consulting, surveying, designing and contracting do not belong in the general category of foreign capital investors investing in Indonesia under the Foreign Investment Law.
   They are not allowed to execute projects financed through the State Budget.

2. Basically foreign firms supplying contracting services are allowed to set up a company under the Indonesian Law by setting up a joint enterprise with an Indonesian firm.

3. Foreign firms supplying consulting and designing services are allowed to set up a company under the Indonesian Law, if they participate with local designers and consultants.

Djakarta, October 1968.
CONSTRUCTION INDUSTRY
MINISTRY OF PUBLIC WORKS AND POWER

INTERNATIONAL DEVELOPMENT ASSOCIATION

REPORT AND RECOMMENDATION OF THE PRESIDENT TO THE EXECUTIVE DIRECTORS ON A PROPOSED CREDIT TO THE REPUBLIC OF INDONESIA FOR A HIGHWAY PROJECT

June 5, 1969

INTERNATIONAL DEVELOPMENT ASSOCIATION

REPORT AND RECOMMENDATION OF THE PRESIDENT TO THE EXECUTIVE DIRECTORS ON A PROPOSED DEVELOPMENT CREDIT TO THE REPUBLIC OF INDONESIA FOR A HIGHWAY PROJECT

1. I submit the following report and recommendation on a proposed Development Credit to the Republic of Indonesia in an amount in various currencies equivalent to $28.0 million for a highway project in Indonesia.

PART I - HISTORICAL

2. The Government of Indonesia has asked for an IDA credit chiefly to help finance the rehabilitation of high-priority roads and the improvement of road maintenance. This would be the first credit for the transport sector in Indonesia. It arises from the first phase of an investigation financed by the UNDP ("1968-70 Highway Services") for which the Bank is Executing Agency. The project was appraised in March and April 1969.

3. Negotiations for the proposed credit took place from May 19 to May 23, 1969. The Borrower was represented by: Mr. Sarsono, Director General of Highway Construction, Ministry of Public Works and Power; Mr. Karnadi, Director of Planning, Directorate-General of Highway Construction; Mr. Soehono, Chief, Communications Bureau, BAPPENAS; Mr. S. Sundaru, Director of International Affairs, Ministry of Finance; Mr. Munding Hidajat, Directorate-General of Highway Construction, Ministry of Public Works and Power; and Mr. Dahlan Ibrahim, First Secretary (Econ.), Embassy of Indonesia.

4. Assuming that the proposed credit for agricultural

estates rehabilitation and development is also approved, this would be the fourth credit to Indonesia. The following is a summary statement of IDA credits to Indonesia as of May 31, 1969:

Credit No.	Year	Borrower	Purpose	Amount $ Million IDA	Undisbursed
127	1968	Indonesia	Irrigation Rehabilitation	5.0	5.0
135	1968	Indonesia	Technical Assistance	2.0	2.0
	Total			7.0	7.0

5. Apart from the proposed credit for the rehabilitation of agricultural estates in North Sumatra already referred to, further credits are under consideration for a power distribution project in Djakarta and for the expansion of the Pusri fertilizer plant and related gas supply facilities.

PART II - DESCRIPTION OF THE PROPOSED CREDIT

6. Borrower: Republic of Indonesia

Amount: Various currencies equivalent to $28.0 million.

Purpose: To rehabilitate high-priority national and provincial roads; to reduce the general deterioration of the highway system by improved maintenance and thus to postpone the need for investment in new construction; to provide the necessary administrative and technical organization for this project and for

future rehabilitation and development of the highway system; and to provide training facilities for all aspects of highway work and administration.

Amortization: In 50 years with a 10-year period of grace through semi-annual instalments commencing December 15, 1979, and ending June 15, 2019.
Each instalment up to and including payment due on June 15, 1989 to be 1/2 of 1 percent of such principal amount and each instalment thereafter to be 1-1/2 percent of such principal.

Service Charge: 3/4 of 1 percent per annum.

PART III - THE PROJECT

7. A detailed description of the project is given in the attached appraisal report entitled "Indonesia: Appraisal of a Highway Project" (PTR-25) dated June 3, 1969.

8. Although the Indonesian transport system is basically well planned and would be adequate for the country's present needs if it were in sound condition, all transport facilities are run down as a result of years of neglected maintenance; the situation is aggravated by a general lack of managerial expertise. A major effort by international and bilateral agencies is being made to meet the most pressing needs, both technical and administrative, within the transport sector.

9. Riding quality on Indonesia's roads is consistently poor, and inadequate maintenance, particularly of the drainage systems,

is causing widespread pavement failure. As a result, road transportation costs are high and tend to inhibit agricultural production in particular. Some important food producing areas are indeed already isolated from their markets. Rehabilitation of the highway network is urgent, therefore, if the country's plans to increase food production are to materialize and if large investments to replace broken-down roads are to be avoided in the near future.

10. The UNDP is financing a study ("1968-70 Highway Services"), for which the Bank is Executing Agency, to determine investment priorities for highways and to assist in planning an effective highway administration. The consultants for the study, KAMPSAX (Denmark)/Louis Berger (U.S.A.), investigated the condition of most of the important roads in the country during the first phase of their work from December 1968 to April 1969. As a result, they proposed in April a rehabilitation program covering about 12,000 km of roads in 20 provinces, and at the same time defined the most urgent investments required for this purpose.

11. Technical and managerial constraints make it impracticable for Indonesia to carry out the whole of the rehabilitation program at this stage. The proposed project would therefore concentrate on the most important rehabilitation needs in five provinces. Its impact would, however, extend to 20 of the 26 provinces in Indonesia by virtue of the proposed workshop and maintenance rehabilitation programs. The remaining six provinces do not have significant highway problems.

12. The project would comprise the following operations:

- rehabilitation of about 3,000 km of roads in five

provinces;

- improvement of routine and periodic road maintenance in those five and a further 15 provinces;
- rehabilitation of workshops in the 20 provinces;
- pilot training and experimental programs for all phases of highway work;
- implementation of inventory and costing techniques; and
- technical assistance to support these operations.

13. Capital expenditure over the four-year project period would amount to US$46.7 million equivalent. The Association would finance imported equipment, materials and the foreign exchange cost of technical assistance required for the project totalling $28 million. The Government has agreed to finance the local currency component of capital expenditures ($18.7 million equivalent) and would also meet the project's recurrent costs of about $9.5 million equivalent; both would be spread over the four-year project period and would together amount annually to less than two percent of the Government development budget even at its present low level.

14. The proposed rehabilitation work is widely scattered and is not easily quantifiable in a form suitable for execution by contract; the rehabilitation program would therefore be executed departmentally. The Directorate-General of Highway Construction, one of the branches of the Ministry of Public Works and Power, would execute the project on behalf of the Government. Agreement has been reached on a framework for project phasing and execution, and on the nature of the consultant services to be made available at central and regional levels.

15. Since rehabilitation would be limited to roads of the highest priority, the rates of return on this part of the project would be very favorable. The economic evaluation has been based on a comparison of rehabilitation costs and the resulting reductions in vehicle operating costs, excluding possible savings in maintenance expenditure and future capital costs. On this basis, the weighted average rate of return on the investment in rehabilitation is over 40 percent.

PART IV - LEGAL INSTRUMENTS AND AUTHORITY

16. The draft Development Credit Agreement between the Republic of Indonesia and the Association, the Recommendation of the Committee provided for in Article V, Section 1 (d) of the Articles of Agreement of the Association and the text of a Resolution approving the proposed credit are being distributed to the Executive Directors separately. The draft Development Credit Agreement follows the usual pattern for highway rehabilitation projects.

PART V - THE ECONOMY

17. The last economic report (EAP-5a) was circulated on May 16, 1969. The current economic situation in Indonesia is described in my report to the Executive Directors today on the proposed credit for estates rehabilitation and development in Indonesia (P-709).

PART VI - COMPLIANCE WITH ARTICLES OF AGREEMENT

18. I am satisfied that the proposed Development Credit would comply with the Articles of Agreement of the Association.

PART VII - RECOMMENDATION

19. I recommend that the Executive Directors approve the proposed Development Credit.

Robert S. McNamara
President

Washington, D.C.
June 5, 1969

INTERNATIONAL BANK
FOR RECONSTRUCTION AND DEVELOPMENT
INTERNATIONAL DEVELOPMENT ASSOCIATION

APPRAISAL OF
A HIGHWAY PROJECT
INDONESIA

June 3, 1969

Transportation Projects Department

CURRENCY EQUIVALENTS

Currency Unit	= Rupiah (Rp.)
US$1.00	= Rp 326 (B.E. Rate*)
1 Rp.	= US¢0.31
1 million Rp.	= US$3,060

*B.E. (Bonus Export) Rate is the rate at which more than 90% of international transactions take place; a special rate applies for less essential imports. No par value has so far been established with the IMF.

FISCAL YEAR

April 1 — March 31

WEIGHTS AND MEASURES

Metric

Metric: British/U.S. Equivalents

1 Kilometer (km)	= 0.62 miles (mi)
1 meter (m)	= 3.28 feet (ft)
1 Liter (l)	= 0.22 imp gallons
	= 0.26 gallons (U.S.)
1 Metric ton (m ton)	= 2204 pounds (lb)

ABBREVIATIONS

MPW	- Ministry of Public Works and Power
PELNI	- the national shipping organization
PNKA	- the national railroad organization
BAPPENAS	- the national planning council
"Highway Services"	- The UNDP
	- financed Highway Services 1968-70"
vpd	- vehicles per day (all types of vehicles, both directions included)
dwt	- dead weight tons

INDONESIA

APPRAISAL OF A HIGHWAY PROJECT

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(Continued)

This report has been prepared by Messrs. P.O. Malone (Engineer) and W. Thalwitz (Economist).

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APPRAISAL OF A HIGHWAY PROJECT

SUMMARY

i. Indonesia's transport system is basically well-planned and if in sound condition would be adequate for the country's present needs. However, as a result of years of neglected maintenance, all transport facilities are run down; conditions are aggravated by a general lack of managerial expertise. A major effort is underway by international and bilateral agencies to meet the most pressing needs, both technical and administrative, within the transport sector.

ii. On Indonesia's roads, riding quality is consistently poor and the neglect of maintenance, particularly that of the drainage systems, is causing wide-spread pavement failure. As a result, road transport costs are high and tend to inhibit agricultural production. Indeed some important food-producing areas are already cut off from their markets. Rehabilitation of the highway network is particularly urgent, therefore, if the country's plans to increase food production are to materialize and if large investments to replace failed roads are to be avoided in the near future.

iii. The UNDP is financing a study, "1968-70 Highway Services", for which the Bank is executing agency, to determine investment priorities for highways and to assist in planning effective highway administration. The consultants for the study, KAMPSAX (Denmark)/Louis Berger (USA), during the first phase of their work, December 1968 - April 1969, inventoried most of the important roads in the country and as a result proposed, in their interim report of April 1969, a rehabilitation program covering

about 12,000 km of road, and defined the most urgent investments required therefor.

iv. The proposed project, part of a larger rehabilitation program, is based on the interim report, and would concentrate on the most urgent rehabilitation needs. Financial and managerial constraints require, in fact, that the rehabilitation work under the project be no more than about onequarter of the program recommended by the consultants. The project would, however, also provide the technical and organizational support needed for this and for all future highway work.

v. In detail the project would consist of the following:

- rehabilitation of about 3,000 km of roads in five provinces;
- improvement of routine and periodic road maintenance in those five and a further 15 provinces;
- rehabilitation of workshops in 20 provinces;
- implementation of inventory and costing techniques;
- implementation of pilot training and experimental programs for all phases of highway work; and
- technical assistance to support the above operations.

The project would have a major impact in 20 of the country's 26 provinces; the remaining six provinces do not have significant highway problems at this time.

vi. Capital expenditure over the four-year project period would amount to US$46.7 million equivalent. The Association would finance imported equipment and materials, and the technical assistance required for the project, totalling US$28 million. The local currency component of capital expenditures (US$18.7

million equivalent) would be financed by the Government. The Government would also finance all recurrent expenditures for the project, totalling US$9.5 million equivalent. The proposed rehabilitation work is widely scattered and could not easily be quantified for contracting purposes; the rehabilitation program would therefore be executed departmentally. The Directorate-General of Highway Construction, one of the branches of the Ministry of Public Works and Power, would execute the project on behalf of the Government.

vii. Because rehabilitation under the project would necessarily be limited to roads of highest economic priority, the rates of return on the investment are very large; the weighted average rate of return on the investments for rehabilitation of the specific road sections included in the project is over 40%. The economic evaluation is based on a comparison of rehabilitation costs and the resulting reductions in vehicle operating costs, excluding possible savings in maintenance expenditures and future capital costs.

viii. The project provides a suitable basis for a credit of US$28 million equivalent to the Government of Indonesia.

INDONESIA

APPRAISAL OF A HIGHWAY PROJECT

1. INTRODUCTION

1.01 The Government of Indonesia has asked the Association for a credit to help finance a project comprising:

(i) rehabilitation of about 3,000 km of high-priority roads;

(ii) improvement of road maintenance operations;

(iii) rehabilitation of workshop facilities;

(iv) establishment of pilot training and experimental programs for all phases of highway work;

(v) implementation of inventory and costing procedures;

(vi) provision of technical experts to support the above operations.

1.02 The project arises from a current UNDP Study ("1968-70 Highway Services"), for which the Bank is executing agency, the objects of which are to determine investment priorities for highways and to assist in planning efficient highway administration. The study, which began in late 1968, is being carried out by the consultants KAMPSAX (Denmark)/Louis Berger (USA). As a result of the first phase of their investigation the consultants have proposed a rehabilitation program covering about 12,000 km of roads.

1.03 The project includes about one-quarter of the consultants' program. It would meet the most urgent highway rehabilitation needs and would in addition provide the necessary technical and administrative organization for this and future road rehabilitation and development. It would be the first loan/credit for transportation in Indonesia.

1.04 The project is based on the consultants' findings as of April 1969. This report has been prepared by Messrs. P. Malone (Engineer) and W. Thalwitz (Economist) who appraised the project in March/April 1969.

2. BACKGROUND

A. General

2.01 Indonesia is an archipelago of more than 3,000 islands stretching 5,000 km along the equator, or a distance equivalent to that across the continental United States. The total land area, about 1.9 million km^2 (including West Irian) is about four times that of France. The major islands, Java, Sumatra, Sulawesi and Kalimantan, account for about 70% of the total land area. (See Table 1)

2.02 The population is estimated at about 115 million, growing at about 2.4% p.a. About 75 million people (or 65% of the total population) live in Java which, however, accounts for only about 7% of the land area. Population pressure in Java and Bali is intense, while vast parts of other islands, particularly Kalimantan, are undeveloped and underpopulated.
The Government, therefore, is attempting to resettle people from Java and Bali to other islands. Urbanization is accelerating and the capital, Djakarta, has a population of over four million. Five other cities, Surabaja, Bandung, Semarang and Jogjakarta in Java, and Medan in Sumatra, have passed the half million mark.

2.03 The main islands are mountainous and are characterized by intense seismic and volcanic activity. Broad coastal plains extend across northern Java, eastern Sumatra and southern Kalimantan. Rainfall is ample everywhere but regional variations range from about 1.5 m to 5.0 m per annum. Heaviest rainfall occurs during the west monsoon season, November through April.

2.04 Indonesia has great potential resources. Nevertheless, with a GDP of about US$80 per capita, it is one of the poorest

countries in the world. Over the past 10 years income growth has barely kept pace with population growth. About 75% of population are occupied in agriculture which accounts for about 50% of the GDP (Rp. 226 billion in 1967). A large portion of agricultural output consists of crops for exports produced in plantations and by smallholders (Rp. 100 billion worth of rubber, coffee, oil palm products, copra, tobacco, tea and pepper, in 1967).

2.05 At present the economy is recovering from a period of stagnating production and rapid inflation. The inflation rate during 1968 decreased to just over 1% per month. Among the factors helping to bring this about were a good rice crop and large imports of PL 480 food grains. The value of exports in 1968 grew by about 8% with petroleum, which accounted for about Rp. 80 billion equivalent in 1967, growing most rapidly. The return of stability has encouraged domestic and foreign investors, and the Government plans to increase development expenditures from Rp. 36 billion in 1968 to Rp. 123 billion in 1969. The economic recovery and the expected increase of output will make additional demands on Indonesia's run-down transportation system. A number of Governments, the UNDP and the Bank Group are assisting Indonesia to meet these growing demands either by technical assistance or direct financial help, as indicated in the following paragraphs.

B. The Transportation System

a. General

2.06 Indonesia has a basically sound transport system which, if efficiently operated and maintained, could adequately serve

present transport requirements. However, facilities in all modes of transport have fallen into disrepair as a result of long neglect and lack of maintenance. The lack of managerial capacity has compounded the effects of scarcity of funds for the maintenance of existing facilities. As a result, the limited maintenance funds available have been mismanaged, investments have been planned haphazardly, and facilities have been operated inefficiently. Government is therefore rightly laying emphasis in the transport sector on planning and management. The UNDP Highway Services (para. 1.02) are developing a framework for planning and execution of rehabilitation and development for highways, and bilateral agreements are likewise providing effective assistance in other transport modes, (the Netherlands in aviation and interisland shipping, and the Federal Republic of Germany in railways).

2.07 As an archipelago, Indonesia uses sea communication as the trunk transport system. There are few natural harbors. but there are an adequate number of ports which connect with the main road and rail arteries of the islands. The inter-dependence of the islands supports sea-borne trade, mainly in rice, copra, oil products, cattle, construction materials, and local and imported manufactured consumer goods. While the road and rail systems primarily connect the interior of the islands with the ports, they also serve to connect surplus and deficit areas within the islands.

b. Highway Transport

2.08 The highway network consists of about 82,000 km of roads of all standards and classifications (Table 1). Paved roads total about 15,000 km and are mostly found on the 32,000 km

network of national and provincial roads (Table 3). The riding quality of most of the system, whether paved or not, is extremely poor; large sections are permanently impassable, others must be closed during the rainy season. (Further details are given in paragraphs 3.01 - 3.05).

2.09 Because of the low standards adopted for road and bridge design, vehicles tend to be small. More than half of the vehicles are over-age. These factors, coupled with the deteriorated condition of the roads, lead to high road transport costs.

c. Railways

2.10 The state railroad organization (PNKA) operates about 7,900 km of track, of which 5,000 km form an interconnected system on Java. Sumatra has four non-connecting lines totalling 2,200 km. The gauge of the system is generally 1.075 m, but the 540 km Atjeh line in Sumatra has a gauge of 0.75 m, and there are about 100 km of 0.60 m track on Java. Infrastructure and rolling stock are in bad condition. Track and bridge maintenance has been neglected since 1939; two-thirds of the entire rolling stock is over 40 years old and 75% of the locomotives are steam-powered. Service to shippers is slow and not always reliable. The average turnaround time for freight wagons approaches one month for a haul of 300 km. PNKA is heavily overstaffed. If the social problems involved could be resolved, it could have its staff of about 85,000 and achieve acceptable ratios of traffic output units per employee.

2.11 PNKA is predominantly a passenger railways, with goods traffic during the last six years accounting for only about 15%

of total traffic. The railway's share in total land transport of goods is small, probably below one-tenth. Between 1962 and 1967 both goods and passenger transport by rail declined, from about 1.0 billion ton-km and 7.0 billion pass-km in 1962 to about 0.6 billion ton-km and 4.5 billion pass-km in 1967. However, provisional data for 1968 show an increase of 35% in freight ton-km. The operating deficit, which must be borne by the Government, is expected to amount to Rp. 5 billion (US$16 million equivalent) in 1968.

d. Ports and Shipping

2.12 There are several hundred ports in the archipelago but the bulk of traffic is handled by about 70. The most important of these are Tandjung Priok (Djakarta) and Surabaja in Java, Belawan and Palembang in Sumatra, Pontianak and Bandjermasin in Kalimantan, Makassar and Bitung in Sulawesi, Ambon in the Moluccas and Sukarnapura in West Irian. Berthage capacities are generally adequate. However, port operations in Indonesia are hampered by conflicting and overlapping administrative responsibilities and lack of supporting facilities. Government investment plans provide for power and water supply, navigational aids and telecommunications, tugs and barges. Technical and economic studies will be undertaken during 1969/70 to determine the extent of the dredging backlog, and to work out schedules for rehabilitation and utilization of the Indonesian dredging fleet.

2.13 The inter-island shipping fleet of powered vessels over 500 tons has a capacity of about 300,000 dwt; almost half the fleet is operated by the state owned organization PELNI. The productivity of the fleet is low, having declined from more than 10 tons carried annually per available ton of dead-weight

capacity to about five tons at present. There is no capacity shortage but the fleet is in bad physical condition. Acting on the recommendations of a Dutch advisory team, PELNI will reduce its fleet capacity by about 25% and rehabilitate the rest. The 130 private shipping companies and PELNI will pool their revenues and maintain regular schedules; this will enable shippers to plan their cargo movements rationally and will permit a better utilization of the whole fleet. Indonesia has a large fleet of sailing boats the capacity of which (400,000 dwt) exceeds that of the powered fleet. During the last few years this fleet has made substantial inroads into the shipping market and now handles about half of the inter-insular shipping volume. Even large companies use sailing vessels for the transport of costly and fragile equipment since owner-operated sailboats are a guarantee of reliable and speedy delivery, free from pilferage.

2.14 River transport has only local significance. It is of particular importance, however, in eastern Sumatra where the road system is not developed to provide adequate connections between the interior and the ports.

e. Aviation

2.15 Due to the long distances between islands and the inaccessiblity of the interior of some larger islands, air transport is growing. In addition, international air communications are being improved to cater for the tourist traffic, especially to Bali. The two international airports, in Djakarta and in Bali, can accommodate the long-haul jet aircraft. There are 36 other airports of which five will be able to receive medium-range jets. All other airports will be improved during the present Five-Year Plan (1969 - 1973), to accommodate Fokker

F-27 turbo-prop aircraft.

2.16 The fleet for the domestic operations of the national airline, Garuda, is largely obsolete and will be replaced during the next five years. Committments have been made for the acquisition of two DC9s and 10 Fokker F-27s. Traffic to Europe and Japan is handled by two DC-8s, in cooperation with KLM, and two Convair 990 turbojets fly within south-east Asia. During the last year Garuda's operations have markedly improved in quality of service and profitability. Garuda is probably the only state enterprise that has solved the problem of overstaffing and has a chance to earn depreciation charges on its equipment in the future. However, there is room for better capacity utilization of the existing and future fleet. This would be possible even without additional investments if existing facilities on Indonesian airports were operated for longer hours.

f. Transport Policy and Coordination

2.17 The main components of Indonesia's transportation system, sea communication and land transport, are complementary. Coordination of competing modes of transport is only required for land transport on Java and Sumatra where the railways have a much smaller network than highways and a small share of total traffic volume. However, since the infrastructre and rolling equipment of both modes of transport are seriously run down, competing claims on resources for investments are substantial, and the need to apply economic criteria to determine priorities and to ration funds is, therefore, particularly pressing. Railway investment requirements alone have been estimated by PNKA to amount to about US$140 million equivalent for the rehabilitation of major lines during the next five years. Until now, investment

decisions in the transport sector have not been based on economic studies, but the Government recognizes that additional economic analyses will be required to determine whether adequate benefits to the economy would justify the large rail investments proposed by PNKA in the Five-Year Plan. In the meantime, the railways proceed cautiously with the most urgent investments for track rehabilitation and rolling stock renewal on the two most important lines in Java and Sumatra. Although road investments are now being prepared under the Highway Services, on the basis of a comparative analysis of costs and benefits, a systematic assessment of priorities between road and rail investments will not be possible until proposed major rail investments have been subjected to thorough analysis, with the assistance of the German Management and Planning team, which is scheduled to arrive in July 1969.

2.18 Shippers, when choosing between road and rail, are frequently influenced more by consideration of quality of service than by comparison of rates and tariffs. The influence of Government taxation policies on the allocation between modes is therefore small. The pump price of regular grade motor fuel in Djakarta was recently raised from Rp. 16 per liter to Rp. 17 per liter (or to about US¢19.7 per US gallon). This is at least US¢10 less than the average pump price in the US.

2.19 There is no specific fuel tax in Indonesia but the total profits of oil companies are turned over to the Government. For 1968 the profit on domestic sales, divided by the quantities of fuel sold, was about Rp. 9 per liter or about US¢10.4 per gallon. Profits remitted to the Government are not a good measure of the contribution by road users, since oil company profits are inflated as a result of low crude prices which do not reflect the

international price or the opportunity cost of fuel to the economy. There is also a substantial subsidy on kerosene which is deducted from these profits. On balance it would appear that gasoline is taxed at about US¢2-3 per gallon, which is a modest contribution by users to the road budget. However, vehicle imports are subject to heavy duties ranging between 40 and 300 p.c. of landed cost, which is an impediment to the development of road transport.

2.20 Transport policies at present include no restrictive administrative regulation upon the growth of road transport. The allocation of traffic, routing and distances is left to competition; within the road transport industry tariffs adjust to market conditions, although in theory the provinces establish controlled rates.

2.21 The institutional arrangements for transport coordination are at present unsatisfactory. Efforts are being made by BAPPENAS, the National Planning Council, to coordinate investments based on proposals for roads prepared by the Ministry of Public Works and Power, and for all other transport investments by the Ministry of Communications. This latter Ministry also has the responsibility for the regulation of transport industries. However, neither of the Ministries nor BAPPENAS has the staff to subject major investments to thorough comparative analyses of cost and benefits. A comprehensive economic survey on traffic cost and allocation, transport investments and rate policies is presently being undertaken by the Transport Coordination Advisory Team under the UNDP Highway Study contract, supported by bilateral assistance teams for the most important transport sectors.

2.22 Improvements in transport coordination are certainly required, particularly in investment analysis, pricing policies and institutional arrangements. It will, however, take time to develop suitable policies and it would not be justified to delay urgent investments for highways until relative priorities in the transport sector as a whole are established and a comprehensive transport coordination policy is available. During negotiations, however, the Government was advised that the Bank Group would wish to discuss overall transportation policies before entering into further commitments to finance transportation investments in Indonesia, and that recommendations of the Transport Coordination Advisory Team should meanwhile be taken into consideration by Government when formulating such policies.

3. THE HIGHWAY SYSTEM

A. General

3.01 The public highway system is classified into "national", "provincial" and "country" roads, (the latter known also as "district" or "village" roads); this classification, indicative of the relative importance of the roads, is used as a basis for defining administrative, financial and executive procedures associated with road construction and maintenance. The national roads, totalling about 10,000 km, are the country's trunk routes; the provincial roads, totalling about 22,000 km, are the main routes of the 26 Provinces; and the country roads, totalling about 50,000 km, comprise all the remaining public roads. In addition, estates and plantations construct and maintain roads outside the public highway system. The extent of the system, by Province, and an indication of the areas and population served, are given in Table 1. The theoretical load-carrying capacity of the system, expressed in terms of permissible axle-loads, is given in Table 2.

3.02 About 15,000 km of the 82,000 km which comprise the public system are paved, the greater part of the paving being on national and provincial roads (Table 3). These paved roads, most of which were constructed many years ago, have stone bases which have served the pavements well in recent years of neglected maintenance. But maintenance is still almost nonexistent and the paved roads are deteriorating quickly.

3.03 The most serious defect along thousands of kilometers of paved roads is the inadequacy of surface drainage; earth shoulders are higher than the pavements which they should drain,

and side ditches, which should receive surface water from the shoulders and which should help to control moisture beneath the pavement, are also too high, or are blocked with debris, or both. These defects are serious in that they produce soaked pavements and thus accelerate ultimate break-up. The stronger pavements have so far resisted complete disintegration, although incipient failure, due in large measure to these drainage defects, is widespread. The less robust pavements have already yielded to neglected maintenance and have become gravel or stone roads, generally difficult for vehicles to negotiate.

3.04 Unpaved roads form the greater length of each class of road, and the bulk of the country roads (Table 3). These roads would normally be maintained by motor grader but the dearth of maintenance equipment, notably of graders, has resulted in most of the roads becoming pot-holed and rutted tracks. Trip speeds of no more than 15 km/h are common on roads in this condition.

3.05 Bridges are usually made of masonry, concrete or steel construction with a concrete deck, and are frequently single-width only. Lack of maintenance over recent years has chiefly affected the steel bridges; many are corroded to the point of danger, some have collapsed, (this is particularly true in Sumatra), and when no replacement has been made the approach roads, no longer trafficked, have reverted to over-grown tracks.

B. Highway Traffic

3.06 The development of traffic on Indonesia's roads is difficult to assess, since 90% of the road transport industry consists of one-vehicle enterprises, and the Government collects few data on the industry. Comprehensive and comparable traffic

counts have not been undertaken for about 10 years.

3.07 In 1967, the road transport fleet totalled about 300,000 vehicles, the majority gasoline-powered, and comprised about 185,000 cars, 18,800 buses and 95,000 trucks; more than 2/3 of the entire fleet was in Java (Tables 4 and 5). The average capacity of the trucks is small and certainly does not exceed 3.5 tons. The age of the fleet (half of the vehicles are more than 10 years old) and the estimated 75 different makes of vehicle in the country lead to difficulties in procuring spare parts and to vehicles being off the road as a consequence. Estimates of the inoperative part of the registered fleet vary from 30% to 50%. In the Five-Year Plan, for instance, it is assumed that the operative truck fleet in 1968 consisted of about 47,000 units only, of which about 25,000 were used as public transport.

3.08 It is estimated that the operative private truck fleet carries about 7 billion ton-km annually; this would imply an average load of 2.5 ton and an annual average mileage of 60,000 km per operative vehicle. Vehicles of the Armed Forces participate in the road transport market, but no reliable information is available on this traffic; it is not unreasonable to assume however, that Armed Forces vehicles carry an additional 2 billion ton-km p.a. so that total goods transport by road would be about 9 billion ton-km p.a.

3.09 Uncertainty about the participation by Armed Forces and about the size of the operative fleet in private hands makes it impossible to reconstruct time series for the development of traffic. Traffic growth must have been minimal or close to zero during the past years of economic stagnation and of deterioration

of the road system and vehicle fleet. This conclusion is supported by the available data on fuel consumption between 1962 and 1968 (Table 6).

3.10 During January/February 1969, the consultants, with the cooperation of the central and provincial works organizations, conducted traffic counts on about 900 important road links, covering all national roads and about 50% of the provincial roads. Although such "spot" counts do not permit the establishment of estimates of total traffic or its regional distribution, they provide adequate data on traffic densities on particular roads. The counts reveal that in Java about one-third of the links have traffic volumes of more than 1,000 vpd, that a significant number carry more than 5,000 vpd, and that only a negligible number carry less than 200 vpd. On Sumatra highest densities are found in the provinces of North Sumatra, West Sumatra and Lampung; traffic volume is typically several hundred vpd, but seldom exceeds 1,000 vpd. On Sulawesi, the North and South provinces have a traffic pattern similar to that found in Sumatra while in the two central provinces traffic rarely rises above 100 vpd. Regular counts should now be undertaken by Government on these and other important roads to provide the information necessary for rational planning of road maintenance and development. An assurance to this effect was obtained during negotiations.

3.11 On the whole, in Indonesia, vehicle operation is expensive; freight rates are, therefore, high by international standards. Typical provincial tariffs are Rp. 10 (US¢3)/ton-km in Java and Bali, Rp. 15 (US¢5)/ton-km in Sumatra and Rp. 20 (US¢6)/ton-km in Sulawesi, but truckers tend to adjust rates to market conditions and costs, particularly where the latter are

unusually high because of poor road conditions (see Chapter 5).

3.12 Road transport regulations relate only to standards for weight and size, vehicle condition, etc., but are not rigorously enforced. Load factors are generally high, on average exceeding 60%, but overloading is widespread and contributes to the deterioration of the roads and endangers the bridges. A national policy on vehicle weights and dimensions is being determined by the consultants; an assurance was obtained during negotiations that the consultants' recommendations will be taken into consideration in the formulation of policy on this issue.

C. Administrative and Financial Procedures

3.13 Administration of the public road system follows the three tiers of the classification of the roads: national roads are the responsibility of central government (in practice, this responsibility is delegated to the Directorate-General of Highway Construction); provincial roads, of the provincial administrations; and country roads of the district administrations. The Directorate-General of Highway Construction is part of the Ministry of Public Works and Power (MPW), which includes, among other branches, the Directorates-General of Irrigation and of Housing and Building (see Chart). This aggregation of functions within the MPW is repeated at provincial level where provincial works organizations are responsible for roads, irrigation and buildings. While this type of organization may not be ideal in a program designed to focus specifically on the highway system, it is acceptable, at least in the short term, and has the merit of economy of common services, such as offices, workshops, administrative personnel, at a time when these services are scarce.

3.14 Financing of road works is normally the responsibility of the organization administratively responsible for the roads, funds for new work and maintenance being met from the development and recurrent budgets, respectively, at each administrative level. Exceptionally, central government finances construction of provincial roads when they are of national or inter-provincial importance; provincial governments may finance country road construction on a similar basis. Provincial budgets are supported in part directly by the export earnings of the provinces themselves; this makes for considerable autonomy on the part of the provinces in highway matters.

D. The Highway Budget

3.15 The volume of construction of national highways since 1963 has been small, much of it being confined to the periphery of Djakarta. Expenditures are difficult to assess accurately because of currency inflation, but MPW figures, adjusted for inflation, indicate that the cost of all construction on national highways during 1963 - 1967 was about US$15 million equivalent, a very small amount. No figures are available for construction of provincial and country roads during this period.

3.16 The consultants for the Highway Services, as a result of their inventory (para. 1.02), estimate that about 12,500 km of roads throughout the country require rehabilitation, at an estimated cost of Rp. 37.2 billion (US$112 million). The budget of the Directorate-General of Highway Construction for the financial year 1969/70 includes Rp. 1.6 billion (US$4.7 million) for rehabilitation and Rp. 3.9 billion (US$11.6 million) for upgrading; this budget was, of course, prepared before the consultants' rehabilitation program was available. No provincial

budgets are available so far. An assurance was obtained at negotiations that, as far as practicable, rehabilitation work, both on national and provincial roads, would accord with the priorities determined by the consultants.

3.17 Maintenance allocations, for all classes of roads, relate, in effect, only to the cost of materials used; equipment depreciation under present accounting procedures is not charged to work, and the personnel employed, even the laborers, are civil servants whose salaries are considered a debit to general administration rather than to specific road works.
The consultants estimate that annual maintenance allocations for national and provincial roads are of the order of US$40/km. Allowing for typical equipment depreciation charges and for labor, the true allocation may be about US$150/km but even this figure, for the national and provincial roads, is inadequate by modern standards; furthermore, under present accounting procedures, it is not possible to determine how effectively the present allocations are used. Typical maintenance requirements/km for all classes of road are being determined by the consultants as part of the Highway Services. An assurance was received during negotiations that maintenance allocations for the project roads would be based on the consultants' findings.

E. The Planning and Engineering of Highway Work

3.18 Selection of construction work on national routes is the responsibility of the Bureau of Planning, part of the Secretariat of the MPW (see Chart). Detailed investigation and engineering are the responsibility of the Directorate-General of Highway Construction and are normally carried out within the department. Planning and engineering on provincial roads are

carried out either by the MPW, as above, or by the provincial works organization, depending on the complexity of the work and availability of staff. Very occasionally, foreign consultants are used, the most recent example being the engineering of the Djakarta by-pass, 1963 - 1965.

3.19 The capacity for planning and engineering is severely limited by the lack of professional and technical staff of all disciplines. The consultants' inventory of personnel shows, for example, that the Planning and Survey Directorate of the Directorate-General of Highway Construction (see Chart), responsible for detailed planning of national road works throughout the country has only 20 civil engineers. At provincial level there are about 20 professional engineers per province in Java and less than 10 per province in the remainder of the country, but these provincial engineers are responsible for buildings and irrigation works as well as for work connected with the highway system. This paucity of professional and technical staff is partly a result of the low output of engineers and technicians from the training institutions, (only about 120 engineering graduates are available each year for both the public and private sectors). Work and pay conditions are also important factors.

3.20 Shortage of planning and engineering staff is one of the major constraints on the size of the program in the highway sector which could be undertaken by the central and provincial works organization. The Highway Services, extending through the end of 1970, and the technical support proposed under the project, provide a measure of relief in the short term, but if the benefits of the proposed project and of future projects are to be maintained in the long term, Government should now seriously consider how the output of trained staff may be increased and

how positions within the planning and engineering functions may be made more attractive. An assurance that Government would take all steps necessary in this respect was obtained during negotiations.

F. The Execution of Highway Work

3.21 Construction and maintenance are normally carried out by departmental forces, but if the volume of new work is beyond departmental capacity at any time, the excess is executed by contract. Most contracting firms are government-owned; there are a few private indigenous contractors who lease the necessary equipment from government. Exceptionally, and again in the case of the construction of the Djakarta by-pass, foreign contractors are used.

3.22 Effective construction and maintenance work requires (i) adequately trained personnel; (ii) the appropriate equipment, well maintained; (iii) ample supplies of materials; and (iv) administrative procedures for planning and controlling the work. Materials are readily available within the country or can be imported without difficulty, but the three remaining factors impose constraints on the amount and quality of work which can be executed, as discussed in the following paragraphs.

3.23 The consultants' inventory discloses a scarcity of executive engineers for highway construction and maintenance works; for example, the Directorate of Construction in the Directore-General of Highway Construction (see Chart) has only 35 professional engineers for its nation-wide operations. As in the case of planning and engineering staff (para. 3.20), an assurance was obtained during negotiations that action would be

taken to increase the number of executive engineers.

3.24 The inventory discloses an almost complete absence of operational construction and maintenance equipment. Equipment has been obtained from many countries over the years and spare parts for much of it are now difficult to procure; it therefore lies idle on the roads or in the workshops and is soon cannibalized. The workshops, particularly in the provinces, have old equipment and an almost complete lack of hand tools, and they are not suitable for the maintenance and support of modern equipment. Inventory procedures for procuring, issuing, controlling and costing spare parts are virtually non-existent. The project includes provision of construction and maintenance equipment, rehabilitation of workshops and implementation of appropriate inventory procedures.

3.25 Accurate job costing forms the basis of planning and of works control, but currently neither highway construction nor maintenance operations are properly costed. Material and labor costs could readily be obtained but with the existing accounting procedures it is not possible to determine the true cost of using equipment, or additionally to benefit from the discipline which costing provides for those responsible for the efficient use of equipment. As part of the Highway Services, the consultants will determine the procedures for costing labor, materials, and equipment appropriate for Indonesian conditions. The project includes implementation of these procedures and provides for assistance during the introductory period.

G. The Role of the Army in Highway Work

3.26 The Army has a large amount of highway construction and

maintenance equipment; it is also a source of engineering expertise additional to that of the works organizations. Holding units ready for emergency operations, such as those caused by flooding or earth-quakes, has first call on the Army's engineering capability, but beyond this need there is a considerable potential of engineering equipment and expertise that could be used on works of economic importance.

3.27 Army engineering units, notably the heavily-equipped construction battalions, are already participating in the Five-Year Plan on road and irrigation works. The more lightly-equipped engineer combat units could, however, also play a useful role; these units are well suited, for example, to carrying out the technically simple but important work necessary to remedy the drainage defects on highways (para. 3.03). Tentative agreement was reached with the Army authorities, during appraisal, that engineer units surplus to operational requirements would be employed, outside the scope of the project, on road work of high economic priority. This agreement was confirmed with the Government during negotiations.

4. THE PROJECT

A. Description and Purpose

4.01 The project comprises:

(i) a four-year program to rehabilitate 109 high-priority roads, totalling about 3,000 km, in five provinces;

(ii) a four-year program to improve routine and periodic maintenance over the road network in 20 provinces, including the five in (i) above;

(iii) the rehabilitation of workshop facilities in the 20 provinces;

(iv) four-year pilot training and experimental programs, in three provinces, for all aspects of highway work;

(v) the implementation of stores inventory and works costing procedures;

(vi) the provision of technical experts to support the above operations;

and includes the procurement of equipment, materials and services therefor.

4.02 The purpose of the project is four-fold: (a) to rehabilitate high-priority national and provincial roads; (b) to reduce the general deterioration of the highway system by improved maintenance and thus to postpone the need for investment in new construction; (c) to provide the necessary administrative and technical organization for this project and for future rehabilitation and development of the highway system; and (d) to provide training facilities for all aspects of highway work and administration. Although Indonesia comprises 26 provinces,

(Table 1), in six the highway rehabilitation and maintenance needs are not significant; improvement of maintenance, and rehabilitation of workshop facilities ((ii) and (iii) above) would therefore be limited to the remaining 20 provinces (see Map).

B. Rehabilitation of High-Priority Roads

4.03 The consultants' study (para. 1.02) provindes a basis for selecting national and provincial highways, the rehabilitation of which would produce large economic benefits. Such roads are located in virtually all provinces, but particularly in those of Java, Sumatra and Sulawesi.

4.04 The rehabilitation program is defined on a provincial basis since works organizations, albeit of varying efficacy, already exist at that level and the consultants' organizational studies to date indicate that development and strengthening of provincial works organizations is a desirable aim. Financial and organizational constraints, however, preclude rehabilitation of all high-priority roads in all provinces at this time.

4.05 The project includes rehabilitation in five provinces, (East and West Java, South and West Sumatra and South Sulawesi), (see Map), the selection being based on the need to rehabilitate the maximum length of road and on the desirability of achieving the widest possible impact throughout the country, compatible with the above-mentioned constraints. Rehabilitation of high-priority roads in other provinces forms part of a larger program, which includes the proposed project. Rehabilitation under the project would be carried out on a provincial basis by "matched"

teams; it would range from minor patching and sealing to replacement of failed bituminous pavements and would include the correction of grade and compaction of shoulders and the rehabilitation of surface-water drainage. Bridge rehabilitation, usually cleaning and painting of steelwork, repair of damaged decks and guard rails, etc., would be included in the work. Exceptionally, dangerous bridges which could not economically be made safe, would be replaced; the replacements would be temporary steel structures since in most instances the optimum alignment of the highway has not yet been determined.

4.06 The project includes the procurement of equipment and materials necessary for this rehabilitation program. An indication of the total equipment requirements per province is given in Table 7.

C. The Improvement of Routine and Periodic Maintenance

4.07 Due largely to lack of equipment, materials and expert personnel, routine and periodic road maintenance over most of the country is virtually non-existent; roads, particularly paved roads, are therefore deteriorating rapidly. Resumption of basic maintenance operations is urgently required if further deterioration is to be avoided.

4.08 In all of the 20 provinces which have significant highway problems, including the five in which rehabilitation will be carried out (see above), a major effort would be mounted as part of the project to resume essential maintenance operations. The project would provide essential equipment, (typical items are indicated in Table 8), also technical expertise to assist in the field and in the workshops (para. 4.18) and the necessary pro-

cedures to cost and control the work (para. 4.16).

D. Rehabilitation of Workshop Facilities

4.09 Adequate workshop facilities are a pre-requisite for effective road maintenance and construction. Existing workshop facilities comprise, on average, one workshop per province but the consultants' inventory reveals that most of this workshop equipment is dilapidated beyond the point of economic repair, and equipment which is operative is old and unsuitable for modern maintenance tasks. Although workshop buildings are adequate or could be made so without major effort, workshop areas are badly drained and are generally cluttered with equipment which has only a scrap value. The road access to many of these provincial workshops is difficult.

4.10 The appropriate organization of workshop facilities, at all levels, has been investigated as part of the Highway Services. From their investigations, the consultants deduce that while the provincial workshop should retain its role, it should in future be limited to component exchange and to repairs of lesser complexity, and that component repair and major overhauls should be carried out only at specially equipped "base" or regional workshops. USAID has agreed to provide the equipment for five such regional shops, two in Sumatra (at Padang and Palembang), two in Java (at Surabaja and near Bandung) and one in Sulawesi (at Makassar) and to provide supervisory staff for their operation, certainly for one year, possibly for two. The location of the shops and their scale of equipment has been agreed between USAID and the consultants for the Highway Services; the shops would be under the control of the Directorate of Equipment Supply, part of the Directorate-General of Highway Construction (see Chart).

USAID has already allocated funds for this equipment and procurement is scheduled before June 1969. The five regional shops are expected to be operational early in 1970.

4.11 The project, therefore, concentrates on rehabilitation of workshop facilities at provincial level and includes (i) the removal of all scrap and obsolete material from the workshops and workshop areas; (ii) the improvement of access to and drainage of these areas; (iii) the repair of workshop buildings as necessary; (iv) the provision of equipment for the provincial workshops; and (v) the provision of mobile servicing units. Assistance in running the rehabilitated facilities would be provided under Technical Support (para. 4.18). The scale of equipment to be provided in each of the 20 provinces is indicated in Table 9.

E. Pilot Programs

4.12 The terms of reference for the Highway Services require the consultants to give support to the highway organizations, to prepare pilot programs for such support and to participate in their operation. Based on the preliminary finding of the consultants, the project includes the establishment and operation of pilot programs in three provinces for a period of four years. The function of the schemes would be three-fold: (i) to train personnel of all levels and disciplines connected with highway construction, maintenance and administration; (ii) to develop and evaluate techniques, most appropriate to the specific region, for highway planning, construction, maintenance and administration; and (iii) to record these techniques in the form of operational manuals.

4.13 The pilot provinces would be North Sumatra, West Java and South Sulawesi. Whereas for operational reasons the pilot provinces in Java and Sulawesi would correspond with provinces chosen for the rehabilitation program, such would not be the case in Sumatra. This would, however, be an advantage since the project would then have a major impact in three Sumatran provinces, two selected for the rehabilitation program and the third as a pilot province.

4.14 Personnel for operating the pilot schemes would be drawn from the central and provincial works organizations, supplemented, through the end of 1970, by the consultants for the Highway Services and by the Technical Support to be provided under the project, (para. 4.18). In the case of Java and Sulawesi, the rehabilitation program in the provinces in question would provide the operational background for the pilot schemes. In the case of Sumatra, which would not have the support of a rehavilitation program, additional equipment would be allocated to the province by reallocation within the national equipment pool.

F. Implementation of Inventory and Costing Techniques

4.15 Inventory and costing methods most appropriate to the needs of the central and provincial works organizations will be defined as part of the task of the Highway Services. In detail, the consultants will define:

(i) the inventory system to be used;

(ii) inventory control and re-ordering techniques;

(iii) the form of job costing for personnel, materials, equipment, workshop facilities and spares;

(iv) the system of construction control using works

budgets; and

(v) the procedure for using equipment depreciation charges as a basis for financing equipment renewal.

4.16 The project includes implementation of these inventory and costing techniques and provides for expert assistance during the introductory stage and for the supply of inventory control and costing equipment. Further assistance. both at central and provincial levels, would be provided as part of the Technical Support (see below).

G. Technical Support

4.17 Because of a shortage of personnel within the works organization and also because of the novelty of much of the equipment and methods which would be introduced, effective implementation of the project would not be possible without large-scale technical support. The project includes such support therefore, both at central and provincial levels, for the first two years of the project period. The possible need to continue this assistance in the latter two years of the program may have to be considered in future projects.

4.18 In detail the technical support comprises: (i) two experts in each of the 20 provinces which have significant road networks, one to assist in the field, the other in the workshop; (ii) five quarrying experts, one to be attached to each of the provincial rehabilitation teams; (iii) three engineer geologists/materials engineers, one per region, to assist in the location and evaluation of sources of materials; and (iv) a directing and coordinating team comprising a highway engineer (who would be team leader), a mechanical engineer and a costing/accounting

expert. The provincial experts ((i) above) would additionally assist in the implementation of costing and inventory methods at provincial level, and the engineer geologists, ((iii) above) would additionally assist in the instructional aspect, particularly in connection with material evaluation, of the pilot programs. Details are given in Table 10.

H. Cost Estimates, Project Financing and Credit Disbursement

4.19 The project would require capital expenditures of US$46.7 million equivalent of which the Bank would finance US$28 million, representing the foreign exchange cost of all imported equipment, materials and expatriate personnel required for the project. Government has agreed to finance the balance of the capital expenditures. Details of capital expenditures are as follows:

Capital Expenditure	Indonesian Rupiahs (million)			US$ (million)		
	Local	Foreign	Total	Local	Foreign	Total
Four-year road rehabilitation program (new equipment and spares, materials and labor)	5,321	4,629	9,950	16.3	14.2	30.5
Four-year road maintenance program (new equipment and spares)	-	1,826	1,826	-	5.6	5.6
Rehabilitation of workshop facilities (new equipment)	65	391	456	0.2	1.2	1.4
Pilot programs (new equipment)	65	33	98	0.2	0.1	0.3
Inventory and costing procedures (new equipment)	-	33	33	-	0.1	0.1
Technical support (personnel)	261	1,630	1,891	0.8	5.0	5.8
	5,712	8,542	14,254	17.5	26.2	43.7
Contingencies	391	587	978	1.2	1.8	3.0
Total of capital expenditure	6,103	9,129	15,232	18.7	28.0	46.7

4.20 Government has agreed to finance all recurrent expenditure required in connection with the project, estimated a Rp. 3,100 million over the four-year project period; this agreement was also confirmed during negotiations. Details are as follows:

Recurrent Expenditure	Indonesian Rupiahs (million)
Labor and materials for maintenance	2,500
Operation of workshop facilities	540
Operation of inventory and costing procedures	60
Total of recurrent expenditure	3,100

The foreign exchange element of recurrent expenditures has not been estimated separately. The Provinces, with the technical support referred to in paras. 4.16 and 4.18, would keep an account of equipment cost, including depreciation, during the project period.

4.21 The estimated cost of the rehabilitation program has been based on preliminary quotations for the supply of equipment, and on unit costs for items of rehabilitation work compiled by the consultants; in the absence of meaningful local costs, the consultants have drawn on their experience of similar work in comparable conditions elsewhere. These unit costs appear realitic.

4.22 The estimated cost of equipment for the road maintenance program has also been based on preliminary quotations. In the absence of realistic maintenance costs, the recurrent cost of the four-year maintenance program has been based on the consultants' provisional recommendations for unit maintenance allocations for different types of road.

4.23 The cost of the rehabilitation and operation of work-

shop facilities has been based on preliminary quotations for equipment, on estimates for repairs to existing buildings and on tentative staffing requirements. Estimates of cost for the pilot programs and for the implementation of inventory and costing procedures have been based chiefly on the cost of the equipment required, (testing and surveying equipment for the pilot programs, processing equipment for the inventory and costing procedures). The estimate of cost for the technical support has been based on rates obtaining in the current Highway Services.

4.24 Disbursement under the proposed credit would be made generally on the basis of 100% of the c.i.f. cost of imported equipment and materials required for the project net of all taxes and local charges, and of the foreign exchange payments made to the consultants providing the technical support. Assuming that the credit would be signed about June 1969, annual requirements of foreign currency under the credit would be as follows:

Bank/IDA financial years	1969/70	1970/71	1971/72	1972/73	Total
Amount (US$ million)	16.4	9.1	1.9	0.6	28.0

In the event of savings under the credit, consideration should be given to procurement of additional road maintenance equipment to be agreed at the time between the Government and the Association.

I. Project Execution

4.25 The project is expected to be completed in about four years, the critical element being the rehabilitation program. The authority responsible for project execution would be the Directorate-General of Highway Construction.

4.26 Procurement of equipment and materials would be phased. After workshops are cleared and repaired, first priority would be procurement of workshop equipment, implementation of stores and inventory procedures and retention of consultants for technical support. Thereafter, with workshops operational and inventory procedures effective, equipment for the rehabilitation and maintenance programs would be procured. All equipment and materials, with the exception of hand tools for the workshops, would be procured under standard Bank/IDA procedures. In the interests of speedy rehabilitation of the workshop facilities, hand tools for the workshops, estimated to cost in total about US$75,000, would be procured by local competitive bidding.

4.27 Providing that a satisfactory contract could be negotiated between the Government and the consultants, experts for the technical support would be provided by KAMPSAX/Berger, the firm currently carrying out the Highway Services. Such a contractual arrangement would have the advantages (a) that in the period before the end of the Highway Services (scheduled to terminate at the end of 1970), the operations of the Services and the technical support could be integrated under the direction of a single firm; (b) that in the period after the end of the Highway Services the technical support contract would provide the means whereby key personnel working under the Services, whom it may be desirable to retain for a further period, could be transferred between contracts without interruption of the services on site.

4.28 Procurement, receipt, issue and accounting of equipment and spares would be the responsibility, at national level, of the Directorate of Equipment Supply (part of the Directorate-General of Highway Construction - see Chart) which would be augmented

for the task from within the MPW, and which would receive additional assistance from the experts provided under the Highway Services and under the proposed technical support. At provincial level these operations, also the rehabilitation and running of workshops, would be the responsibility of the provincial works organizations assisted by the experts assigned to the workshops in each province under technical support.

4.29 The road rehabilitation program in the five selected provinces would be executed departmentally, since the work, by its nature being widely scattered and not easily quantifiable, is unsuitable for normal contract procedure. The staff in the provinces selected would be augmented as required for the execution of the program by reallocation of personnel within the central and provincial works organizations, and would be assisted by the experts provided under the proposed technical support. The maintenance program would be executed by the provincial works organizations, likewise assisted by the proposed technical support, Costing of all work, both in the workshop and on site, would be introduced progressively in all 20 provinces covered by the project.

4.30 The pilot programs, currently being formulated as part of the Highway Services, would be executed by the works organizations of the three provinces selected, augmented as necessary from within the central and provincial work organizations. The programs would be supported initially by the consultants for the Highway Services and later by the technical support provided under the project.

5. ECONOMIC JUSTIFICATION

A. General

5.01 The tasks facing Indonesia in the transport sector are to prevent the further deterioration of a basically well planned and generally adequate network, to improve the managerial and operating efficiency of the principal agencies involved and to make some new invenstments to meet particularly pressing needs. Since the resources, capital and human, to achieve these objectives are limited, a careful ordering and balancing of priorities is necessary. The Government has decided to put the greatest emphasis on rehabilitating the road system and improving managerial and executive capacity in the railways, ports, etc. This priority to the road sector is appropriate for at least two sound economic reasons. First, deteriorating road conditions, by increasing transport costs, inhibit the marketing of agricultural produce; in some cases the physical deterioration of roads has gone so far as to cut off producing areas from their markets entirely. Secondly, if increased expenditures are not made on the road system, it will physically deteriorate at an increasing rate and result in both earlier and greater capital investment for reconstruction.

5.02 In addition to investments in equipment for rehabilitation and maintenance, the project includes technical and organization support by consultants to the highway administration. It is not possible to attribute any direct benefits to the expenditures for these consultants' services. They are, however, fundamental to the provision of executive capacity, without which this project and future rehabilitation and development could not be undertaken.

B. Rehabilitation

5.03 The immediate objective of the proposed project is to rehabilitate 109 road sections totalling about 3,000 km, or one-quarter of the total length included in the national road rehabilitation program that has been prepared by the consultants, KAMPSAX/Berger. For purposes of the economic evaluation, rehabilitation costs have been assessed to include an allowance for equipment depreciation, expenditures for labor and materials, and administrative overheads. Accordingly, rehabilitation costs for the roads included in this proposed project would be Rp. 9.23 billion or US$28.3 million equivalent, while the total estimated cost for the larger and longer run national road rehabilitation program is estimated to be Rp. 37.2 billion or US$114 million equivalent.

5.04 These overall rehabilitation needs of Indonesia's road system are so large that rational phasing and concentration of effort are essential. The project, therefore, concentrates on immediate rehabilitation work in the five provinces, West and East Java, South and West Sumatra and South Sulawesi, in which the amount of rehabilitation work on roads of highest priority is sufficiently big to ensure full utilization of large equipment teams. These teams are not divisible without incurring substantial diseconomies of operation.

5.05 The average daily traffic on the road sections selected for inclusion in the project is generally in the higher category of traffic densities. However, the project does include a number of roads which at present have little or no traffic; these roads which were formerly of local importance, generally for agriculture, are now so difficult to negotiate as to be

almost, if not entirely, impassable. On these roads traffic generation can be expected in the first year after road rehabilitation since production surpluses are available for marketing. On most of the other roads normal traffic growth is expected to be resumed with the recovery of the economy. Taking into account the economic potential of specific regions, the consultants have estimated that this normal growth of traffic will usually be between 5 and 7% p.a. In the view of the Resident Staff in Indonesia, these estimates are reasonable.

5.06 The cost of road transport in Indonesia is unquestionably high. This, among other things, is due to the use of vehicles with small load capacities. An analysis is currently being undertaken by KAMPSAX/Berger to see whether it would be economical to increase the load capacity of the existing road system substantially in the future. In the meantime, significant benefits can be obtained merely by repairing existing roads. The benefits attributed to the project, therefore, are only savings in vehicle operating costs from the improvement of pavement conditions. In the course of making the highway inventory, the consultants have classified all road links, according to surface condition, in five major groups for each pavement type. Tables 11 and 12 show the cost of operating average size (3.5 t) trucks and cars on good surfaces. The costs (excluding taxes) per vehicle-km of Rp. 20.5 (US¢6.3) for trucks and buses and Rp. 7.3 (US¢2.2) for cars relate only to surface conditions and do not take account of other factors such as gradients, degree of curvature, etc.

5.07 Tables 13 and 14 show how these operating costs per vehicle-km vary with the different surface conditions; for example, on very poor quality asphalt roads (Condition 5) the

operating cost for trucks has been estimated by the consultants at Rp. 51.4 (US¢15.8). The priorities of rehabilitating particular roads were derived on the basis of first year benefit-cost ratios; these ratios compare rehabilitation costs with the benefits accruing in the year immediately after completion of the investment by improvement from one surface condition to another. In these cases where traffic is minimal or has stopped, the net added value of generated goods traffic has been taken as the primary benefit.

5.08 This method is acceptable for priority ranking and for making a preliminary selection of roads for investments. There are about 6,000 km of roads in Indonesia for which the benefits in the first year exceed half the investment costs. However, due to financial and administrative constraints, the project is limited to five provinces and covers about 3,000 km of these roads.

5.09 For purposes of the economic analysis of the roads in the project a comparison of costs and benefits over a period of seven years has been undertaken. This period corresponds to the time interval between the need for rehabilitation now and the likely time in the future for major improvement or reconstruction. In the present conditions of Indonesia, it is extremely difficult to associate particular levels of vehicle operating costs with each category of road condition; available data are scarce and unreliable. When the surface of an asphalt road is corrugated or so completely broken up that truck speeds do not exceed 15 km/h, the cost of operating a vehicle becomes extremely high and, indeed, may be double the cost of operating on a normal asphalt pavement. While there is no information available to question

the potential savings which the consultants attribute to rehabilitating roads in particular conditions (see Table 13 and 14), it is considered prudent to reduce them by an arbitrary 50% to provide a measure of safety which eliminates the risk of over-estimating the benefits.

5.10 This substantial reduction in benefit estimates does not alter the basic justification of the project. The internal rates of return for the investment exceed 15% in all cases, and the weighted average rate of return for the investments on 109 road sections is over 40%. Rehabilitation of the roads selected is therefore clearly justified.

C. Maintenance

5.11 The project also provides for the acquisition of maintenance equipment for 20 provinces at a total cost of US$5.6 million. This will permit resumption of normal maintenance operations on about 5,000 km of roads which are either not maintained or are under-maintained. The provincial highway administration will select the particular road sections involved under guidance from the technical advisors to be appointed as part of the project.

5.12 The benefits to be expected from the expenditures for maintenance consist mainly of reductions in vehicle operating cost, which depend on present surface conditions and traffic volumes of particular roads selected. Experience by the Bank Group with maintenance projects in other countries shows that improved maintenance generally results in reductions of vehicle operating costs of at least 15%. This does not take account of any increase in existing vehicle operating costs which would

result if maintenance operations were continued with the present limited equipment and inefficient techniques, and which as a result of the project expenditures will be avoided.

5.13 The internal rates of return on the investment for improved maintenance would exceed 20% in those cases where traffic volumes exceed 200 vehicles per day. Since most of the roads which would be maintained carry more than 200 vehicles, the proposed investments for improved maintenance are considered adequately justified. The proposed investment of US$5.6 million in any case, represents only about 7% of the country's ultimate requirement for highway maintenance equipment.

5.14 There is room for additional refinement in methodology and data, but more exact quantification of the rate of return on the project would require costly and time-consuming research on vehicle operating costs, maintenance expenditure and investment costs for future reconstruction and improvements. While the present analysis does not fully assess the rate of return on the project, it demonstrates, based on the available data, the urgency of the proposed investments. In view of the high returns, it would not be economical to await the results of more refined research while the erosion of a significant amount of capital in Indonesia's roads continues.

6. RECOMMENDATIONS

6.01 During credit negotiations agreement was reached on the following principal points:

(i) the need to consider the recommendations of the Transport Coordination Advisory Team when formulating transport policy, (para. 2.22);

(ii) the need to schedule rehabilitation, throughout the country, generally in accordance with the priorities established by the consultants as part of the current Highway Services,(para. 3.16);

(iii) the need to base allocations for maintenance of national and provincial roads on the consultants' recommendations, (para. 3.17);

(iv) the need to attract and retain additional trained staff for the planning, engineering and execution of highway work, both in the central and provincial works organixations, (paras. 3.20 and 3.23);

(v) the need to utilize Army engineer units, surplus to operational requirements, on road work of high economic priority which is outside the scope of the project, (para. 3.27).

6.02 The proposed project provides a suitable basis for a credit of US$28 million equivalent to the Government of Indonesia.

June 3, 1969

INDONESIA-HIGHWAY PROJECT

THE PUBLIC HIGHWAY SYSTEM[1] (July 1968)

TABLE 1

Region	Area by region (km^2)	Area % of national area	Population (1968) by region (millions)	Population (1968) % of national population	Province	National Roads (km)		Provincial Roads (km)		County Roads (km)		Total (km)
J a v a	132,000	7	74.8	65.0	(Djakarta	-		450		-		
					(West Java	620		1,850		4,970		
					(Central Java	410		1,800		6,680		
					(Jogjakarta	30		110		740		
					(East Java	520		2,690		6,930		
						1,580	+	6,900	+	19,320	=	27,800
Sumatra	474,000	25	18.6	16.2	(Atjeh	490		1,040		3,540		
					(North Sumatra	790		2,390		3,540		
					(West Sumatra	570		1,080		1,890		
					(Riau	90		660		840		
					(Djambi	430		570		610		
					(South Sumatra) (Bengkulu) (Lampung	660		3,470		2,760		
						240		510		2,250		
						3,270	+	9,720	+	15,430	=	28,420
Kalimantan (Indonesian Borneo)	539,000	28	4.8	4.2	(West Kalimantan	450		990		500		
					(Central Kalimantan	80		80		50		
					(South Kalimantan	280		490		1,800		
					(East Kalimantan	200		220		70		
						1,010	+	1,780	+	2,420	=	5,210
Sulawesi (Celebes)	189,000	10	8.4	7.3	(North Sulawesi	720		380		80		
					(Central Sulawesi	600		610		3,420		
					(South Sulawesi	580		1,230		2,180		
					(South-East Sulawesi	190		240		1,620		
						2,090	+	2,460	+	7,300	=	11,850
The Principal Smaller Islands	94,000	5	7.5	6.5	(Bali	390		310		1,050		
					(West-Nusa Tenggara	490		70		1,710		
					(East-Nusa Tenggara	1,230		340		1,350		
					(Maluku	80		220		540		
						2,190	+	940	+	4,650	=	7,780

West Irian (Indonesian New Guinea)	422,000	22	0.9	0.8	West Irian	-		880		-	=	880
TOTAL	1,850,000	97 2/	115.0 3/	100.0		10,140	+	22,680	+	49,120	=	81,940

Notes 1/ Exclusing municipal roads (totalling about 2,000 km).

2/ The total land area of Indonesia, including numerous smaller islands not in the above grouping, is approximately 1,904,000 km^2.

3/ Population figures derived by applying the estimated annual growth rate of 2.4% to the 1961 census figures.

Sources: Area & population statistics: "INDONESIA, FACTS & FIGURES" - Indonesian Academy of Statistics (1967).
Highway statistics: Directorate-General of Highway Construction, Ministry of Public Works & Electric Power.

April 29, 1969

TABLE 2

INDONESIA - HIGHWAY PROJECT

THE PUBLIC HIGHWAY SYSTEM

DESIGN LOAD-CARRYING CAPACITY

Class	Design Axle-Load[1] (Metric Tons)	National Roads km^2)	%	Provincial Roads km^2)	%	Country Roads km^2)	%	Total System km^2)	%
I	7.00	70	1	50	about 1/4	-	-	120	about 1/7
II	5.00	1,230	12	1,250	6	-	-	2,480	3
III	3.50	3,200	32	9,000	41	-	-	12,200	15
III-A	2.75	1,900	19	4,000	18	-	-	5,900	7
IV	2.00	2,000	20	7,000	32	-	-	9,000	11
V	1.50	1,600	16	700	3	50,000[3]	100	52,300	64
		10,000	100	22,000	100	50,000	100	82,000	100

1/ The works organizations' procedures for determining pavement strength are conservative, and the above figures may therefore be pessimistic; the weight and volume of traffic using the system confirms this. (Pavement strength is, in any case, affected by the moisture condition below the pavement and would undoubtedly be improved by simple works designed to eliminate the more serious defects of the surface drainage system, (para. 3.03). The load-carrying capacity of the bridges is generally compatible with that of the road of which they form part, but the weights of vehicles using the bridges indicate that bridge classification, too, may be unduly pessimistic.

2/ Lengths' rounded to accord with the approximate total length of the system, (para. 3.01).

3/ The classification of country roads as 'V' reflects primarily the strength of the bridges only, since 90% country roads are unpaved (Table 3) and pavement strength is not meaningful unless ambient conditions are specified.

Source: Directorate-General of Highway Construction, Ministry of Public Works and Power.

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TABLE 3

INDONESIA - HIGHWAY PROJECT

THE PUBLIC HIGHWAY SYSTEM

Analysis by Type of Surface

		National Roads		Provincial Roads		Country Roads		Total	
		Km 1)	%	Km 1)	%	KM 1)	%	Km 1)	%
Paved	Asphalt Concrete	150	1.5	-	-	-	-	150	0.2
	(Bituminous Surface Treatment	4,500	45.0	8,000	36.4	3,000	10.0	15,500	18.9
UN-Paved	(Gravel	5,350	53.5	12,000	54.5	16,500	31.0	33,850	41.3
	(Earth	-	-	2,000	9.1	30,500	59.0	32,500	39.6
		10,000	100.0	22,000	100.0	50,000	100.0	82,000	100.0

1) Lengths rounded to accord with approximate total length of system (para. 3.01)

Source: Directorate-General of Highway Construction; Ministry of Public Works and Power

April 29, 1969

TABLE 4

INDONESIA - HIGHWAY PROJECT

VEHICLE FLEET 1/

	Cars	Buses	Trucks	Total
1961	129,300	17,800	70,000	217,100
1962	124,400	16,800	66,000	207,200
1963	127,800	18,200	69,200	215,200
1964	n.a.	n.a.	n.a.	n.a.
1965	166,800	18,400	84,700	269,900
1966	179,500	19,600	92,900	292,000
1967	185,000	18,800	94,900	298,700

1/ Excluding Armed Forces

Source: Central Bureau of Statistics

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TABLE 5

INDONESIA - HIGHWAY PROJECT

VEHICLE FLEET - REGIONAL DISTRIBUTION

1965-1968

	Year	Cars	Busses	Trucks	Total
1. J a v a	1965	129,957	8,606	50,222	188,785
	1966	139,787	9,315	56,478	205,580
	1967	144,107	8,329	57,311	209,747
2. Sumatra	1965	24,514	7,916	23,328	55,758
	1966	26,632	8,328	25,055	60,015
	1967	27,509	8,297	25,446	61,252
3. Sulawesi	1965	3,433	718	4,334	8,485
	1966	3,492	820	4,188	8,500
	1967	3,770	947	5,381	10,098
4. Kalimantan	1965	3,881	311	3,248	7,440
	1966	4,305	265	3,484	8,054
	1967	4,210	322	3,187	7,719
5. Other Islands	1965	5,060	863	3,522	9,445
	1966	5,278	856	3,686	9,820
	1967	5,358	945	3,567	9,870
6. Total Indonesia	1965	166,845	18,414	84,654	269,913
	1966	179,494	19,584	92,891	291,969
	1967	184,954	18,840	94,892	298,686

Source: Central Bureau of Statistics

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TABLE 6

INDONESIA - HIGHWAY PROJECT

ROAD TRANSPORT FUEL CONSUMPTION

	Gasoline (Metric tons) '000				Dieselfuel (Metric Tons) '000			
	Java	Sumatra	Other	Total	Java	Sumatra	Other	Total
1962	n.a.	n.a.	n.a.	1,235	n.a.	n.a.	n.a.	746
1963	n.a.	n.a.	n.a.	1,233	n.a.	n.a.	n.a.	895
1964	n.a.	n.a.	n.a.	872	n.a.	n.a.	n.a.	800
1965	958	182	57	1,198	186	255	36	1,107
1966	925	226	52	1,399	590	238	45	873
1967	1,006	280	50	1,336	422	238	47	707
1968	1,053	315	56	1,423	403	259	42	705

1/ Including Armed Forces

Source: Pertamina

April 29, 1969

INDONESIA - HIGHWAY PROJECT

TABLE 7

Road Rehabilitation Teams and Equipment

1. Each provincial rehabilitation team comprises a number of different sub-teams equipped to carry out: (i) pavement renewal; (ii) pavement resealing; (iii) unpaved road rehabilitation; (iv) stone production; or (v) bridge repair. The specific complement of sub-teams in any provincial rehabilitation team is determined by: (a) the length of roads to be rehabilitated; and (b) the nature of the roads (for example, paved or unpaved).

2. The principal items of equipment for each of the sub-teams are typically as follows [1]:

Sub-Teams / Equipment	Truck-Mounted Asphalt Distributor	Trailer-Mounted Asphalt Heater	Mechanical Broom	Compressor (small) and Tool Set	Compressor (large) and Tool Set	Crushing Equipment	Concrete Mixer	Pick Up	Hydraulic Jack	Mechanical Shovel Wheeled	Motor Grader 80 - 112 H.P.	Pulvi-Mixer	Mixing Plant - Gravel Pits	4" Pump	Tandem Roller	Rubber-Tired Roller	Power Saw	Stone Spreader	Chip Spreader	Crawler Tractor (D6)	Dump Truck (5-ton)	Flat-bed Truck	Water Truck (6000 liter)	Lubrication Truck	Repair Truck	Fuel Supply Truck	Tractor Truck	Quarry Truck	Industrial Tractor	Plate Vibrator	Concrete Vibrator	Welding Set	20-ton Winch	Drilling Rig
Pavement Renewal [2]	1	2	1	1	-	-	-	3	-	2	3	2	-	-	6	-	-	1	1	1	48	4	4	1	1	1	1	-	2	-	-	-	-	-
Pavement Resealing [2]	1	3	1	2	-	-	-	2	-	1	1	-	-	-	3	1	-	-	1	-	18	-	-	1	1	1	-	-	1	1	-	-	-	-
Unpaved Road	-	-	-	-	-	-	-	2	-	1	2	-	1	-	2	2	-	-	-	1	33	1	4	1	1	1	-	-	-	-	-	-	-	-
Stone Production	-	-	-	-	2	1	-	-	-	1	-	-	-	-	-	-	-	-	-	1	7	2	-	1	-	-	-	4	-	-	-	-	-	1
Bridge Repair	-	-	-	8	4	-	8	8	16	-	-	-	-	8	-	-	8	-	-	-	-	20	-	-	-	-	-	-	-	20	4	8	-	

Notes: [1] These scales of equipment represent the operational requirements of the sub-teams; the equipment to be procured under the project represents these scales of equipment less existing equipment which is, or could economically be made, operational.

[2] These sub-teams will also correct deficiencies in shoulder grade and compaction and in the surface water drainage system, as part of the pavement renewal/resealing operation.

Composition of the rehabilitation teams in the five provinces selected is as follows:

Sub-Team \ Province		East Java	West Java	South Sumatra	West Sumatra	South Sulawesi
Pavement Renewal		1	1	1	1	1
Pavement Resealing		1	1	1	1	-
Unpaved Road		-	-	1	2	1
Stone Production		2	2	2	2	2
Bridge Repair		4	3	1	2	3
Lengths to be rehabilitated under project (km)	paved	783	883	344	306	40
	unpaved	-	-	83	252	348

The average cost of equipment to be procured for each of the five provincial road rehabilitation teams (that is, net of existing operational equipment in the provinces) is in the order of US$2.25 million equivalent, c.i.f. Djakarta and including 20% of basic cost for inital supply of spares.

May 13, 1969

INDONESIA - HIGHWAY PROJECT

TABLE 8

Equipment for Urgent Provincial Road Maintenance

Urgent road maintenance equipment needs vary between provinces depending on the extent of the highway system in the province (Table 1), and on the amount of existing equipment which could be made operational. This Table sets out the allocation for road maintenance equipment under the project, for each of the 20 provinces with significant highway maintenance problems, and indicates the principal items of equipmen to be provided under the project.

MAINTENANCE EQUIPMENT ALLOCATION BY PROVINCE

Region	Province	Allocation under Project for maintenance equipment (US$ million)
Java	West Java	0.45
	Central Java	0.30
	Jogjakarta	0.10
	East Java	0.10
Sumatra	Atjeh	0.36
	North Sumatra	0.20
	West Sumatra	0.35
	Riau	0.24
	Djambi	0.36
	South Sumatra	0.30
	Bengkulu	0.28
	Lampung	0.36
Kalimantan (Indonesian Borneo)	West Kalimantan	0.40
	South Kalimantan	0.40
	East Kalimantan	0.40
Sulawesi (Celebes)	North Sulawesi	0.10
	South Sulawesi	0.30
The Principal Small Islands	Bali	0.10
	West-Nusa Tenggara	0.25
	East-Nusa Tenggara	0.25
	TOTAL	5.60

June 3, 1969

PRINCIPAL ITEMS OF EQUIPMENT TO BE PROVIDED

Item	No.
Truck-mounted asphalt distributor	7
Asphalt heating tank (stationary)	67
Compressor (small) and tool set	33
Concrete Mixer	34
Pick-up	60
Compressor (large) and tool set	9
Mechanical Shovel, wheeled	13
Motorgrader, 80 H.P.	28
Pump (4")	35
Crushing and Screening Plant	2
Chip Spreader	4
Dump Truck	150
Flat-bed truck	144
truck with Crane	55
Concrete vibrator	83
Welding set	8
Base Radio	20
Satellite radio	100
Generating Set	6

TABLE 9

INDONESIA - HIGHWAY PROJECT

Provincial Workshop Rehabilitation

Details and Cost Estimate

Major items of equipment to be supplied per provincial workshop	Association Financing US$	Government Contribution Rp. (million)
Lathe and attachments Floor drill press Floor dual grinder Bench-mounted drill press Bench-mounted dual grinder Work benches complete (3 No.) Hand operated hydraulic press Mobile arc-welder Mobile gas-welder Power shears Power hacksaw Air compressor Fuel injection pressure tester Battery charging equipment	40,000	
Hand tools	3,750	
Stationary oil and greasing equipment	8,000	
Total for one workshop	51,750	
Total for 20 workshops	1,035,000	
Contingency item for additional equipment	165,000	
Repairs to existing buildings		65
Running costs (personnel, materials, overheads) over 4-year period		520
	US$ 1,200,000	

May 13, 1969

TABLE 10

INDONESIA - HIGHWAY PROJECT

Technical Support - Details and Cost Estimate

	Association Financing US$(million)	Government Contribution Rp (millions)
Personnel (all for a 2-year period)		
(a) 2 No. experts in each of 20 provinces	2.88	
(b) 5 No. quarrying experts	0.40	
(c) 3 No. Engineering Geologists/ Materials Engineers	0.27	
(d) Directing & Coordinating Team (3 experts)	0.32	
(e) Subsistence for (a) through (d) above		207
Support Costs		
(f) Air Travel		
International	0.17	
Internal	0.18	
(g) Miscellaneous requirements (vehicles, shipping costs, portable testing equipment)	0.21	33
Contingency	0.57	21
	5.00	261

May 13, 1969

TABLE 11

INDONESIA - HIGHWAY PROJECT

Operating Cost of a Representative (3.5 ton capacity) Truck on a Flat Paved Road*

	Rupiahs with taxes	Rupiahs net of taxes
1. Basic Data and Assumptions		
Cost of Vehicle	2,040,000	1,600,000
Cost of one set of tires	120,000	114,000
Average gross vehicle weight:	6.5-7 metric tons	
Average vehicle life :	5 years	
Average annual mileage :	60,000 km	
Average tire life :	75,000 km	
Average time in use per year:	2,000 hours	
2. Fixed Costs Per Year		
Depreciation	102,000	80,000
Interest	216,000	171,400
Insurance	70,000	58,000
Driver and Assistant	280,000	280,000
License; Yearly Taxes	11,600	-
Overheads	195,000	195,000
Total Fixed Costs per Year	874,600	784,400
Fixed Cost per Hour in Use	437	390
Fixed Costs per km	6.06	5.36
3. Running Costs per km		
Depreciation	5.10	4.00
Fuel	4.00	4.00
Oil and Lubricants	0.18	0.15
Tires and Tubes	1.60	1.52
Maintenance: Labor	0.69	0.69
Parts	6.70	4.80
Total Running Cost per km	18.27	15.16

4. Total Cost per km at a Vehicle Speed of 72 km/hr	24.33	20.52

* For operating costs on other types and conditions of road, see Table 14.

June 2, 1969

TABLE 12

INDONESIA - HIGHWAY PROJECT

OPERATING COST OF A REPRESENTATIVE CAR ON A FLAT PAVED ROAD*

1. Basic Data and Assumptions		Rupiahs with taxes	Rupiahs net of taxes
Vehicle Cost		1,875,000	750,000
Cost of one set of Tires		28,000	26,500
Average net weight:	1360 kg		
Average vehicle life:	10 years		
Average annual mileage:	15,000 km		
Average tire life	50,000 km		
Average time in use per year:	1,000 hours		
2. Fixed Costs per year			
Depreciation		93,750	37,500
Interest		190,300	77,650
Insurance		32,400	13,500
License; Yearly Taxes		9,700	-
Total Fixed Costs per year		326,150	128,650
Fixed Cost per Hour in Use		326	129
Fixed Cost per km		4.03	1.57
3. Running Cost per km			
Depreciation		6.25	2.50
Fuel		1.60	1.60
Oil and lubricants		0.12	0.10
Tires and Tubes		0.56	0.53
Maintenance:	Labor	0.19	0.19
	Parts	1.15	0.82
Running Cost per km		9.87	5.74
4. Total Cost per km at a Vehicle Speed of 80 km/hour		13.90	7.31

* For operating costs on other types and conditions of road, see Table 13.

June 2, 1969

INDONESIA - HIGHWAY PROJECT

INDONESIA - HIGHWAY PROJECT

TABLE 13

Operating Cost of a Representative Car on Various Road Surface and Condition

	Bituminous Road in Condition 1/					Gravel Road in Condition					Earth Road in Condition		
	1*	2+3	4	5	6+7	1	2+3	4	5	6+7	1+2+3	4+5	6+7
TIME COSTS Rp. per km	1.57	1.81	2.04	2.44		1.81	2.05	2.40	2.52		2.05	2.75	
RUNNING COSTS, Rp. per km													
Depreciation	2.50	2.88	3.62	4.50		2.90	3.25	3.75	4.50		3.25	4.75	
Fuel and Lubricants	1.70	1.95	2.21	2.55		1.95	2.21	2.38	2.55		2.21	3.40	
Tires and Tubes	0.53	0.64	0.93	1.85		0.61	0.69	0.93	1.85		0.69	1.85	
Maintenance and Repair	1.01	1.16	1.46	1.82		1.16	1.31	1.52	1.82		1.31	1.92	
SUBTOTAL	5.74	6.63	8.22	10.72		6.62	7.46	8.58	10.72		7.46	11.92	
TOTAL COSTS, Rp. per km	7.31	8.44	10.26	13.16	22.-	8.43	9.51	10.98	13.24	22.-	9.51	14.67	22.

1/ Condition 1 = Good; 2+3 = Some Potholes, fair; 4 = Corrugated; 5 = Rutted, Breaking up; 6+7 = Impassable to all but 4-Wheel drive vehicles

* See Table 12

April 29, 1969

TABLE 14

INDONESIA - HIGHWAY PROJECT

Operating Costs, without taxes, of a Representative (3.5 ton capacity) Truck on Various Road Surface Types and Conditions

(Rupiah/km)

	Bituminous Road in Condition 1/					Gravel Road in Condition					Earth Road in Condition		
	1*	2+3	4	5	6+7	1	2+3	4	5	6+7	1+2+3	4+5	6+7
TIME COSTS, Rp. per km	5.36	6.86	8.56	13.40		6.96	8.04	9.75	13.40		8.05	13.40	
RUNNING COSTS, Rp. per km													
Depreciation	4.00	5.00	7.20	10.00		5.00	6.00	7.40	10.00		6.00	11.00	
Fuel and Lubricants	4.15	4.97	6.22	7.46		4.97	6.20	6.65	7.46		6.21	11.20	
Tires and Tubes	1.52	1.98	3.04	6.85		1.82	2.28	3.04	6.85		2.28	6.85	
Maintenance and Repair	5.49	6.85	9.90	13.70		6.85	8.24	9.90	13.70		8.24	15.10	
SUBTOTAL	15.16	18.80	26.36	38.01		18.64	22.72	26.99	38.01		22.73	44.15	
TOTAL COSTS, Rp. per km	20.52	25.66	34.92	51.41	82.-	25.60	30.76	36.84	51.41	82.-	30.78	57.55	82.-

1/ Condition 1 = Good; 2+3 = Some Potholes, fair; 4 = Corrugated; 5 = Rutted, Breaking up; 6+7 = Impassable to all but 4-Wheel drive vehicles

* See Table 11

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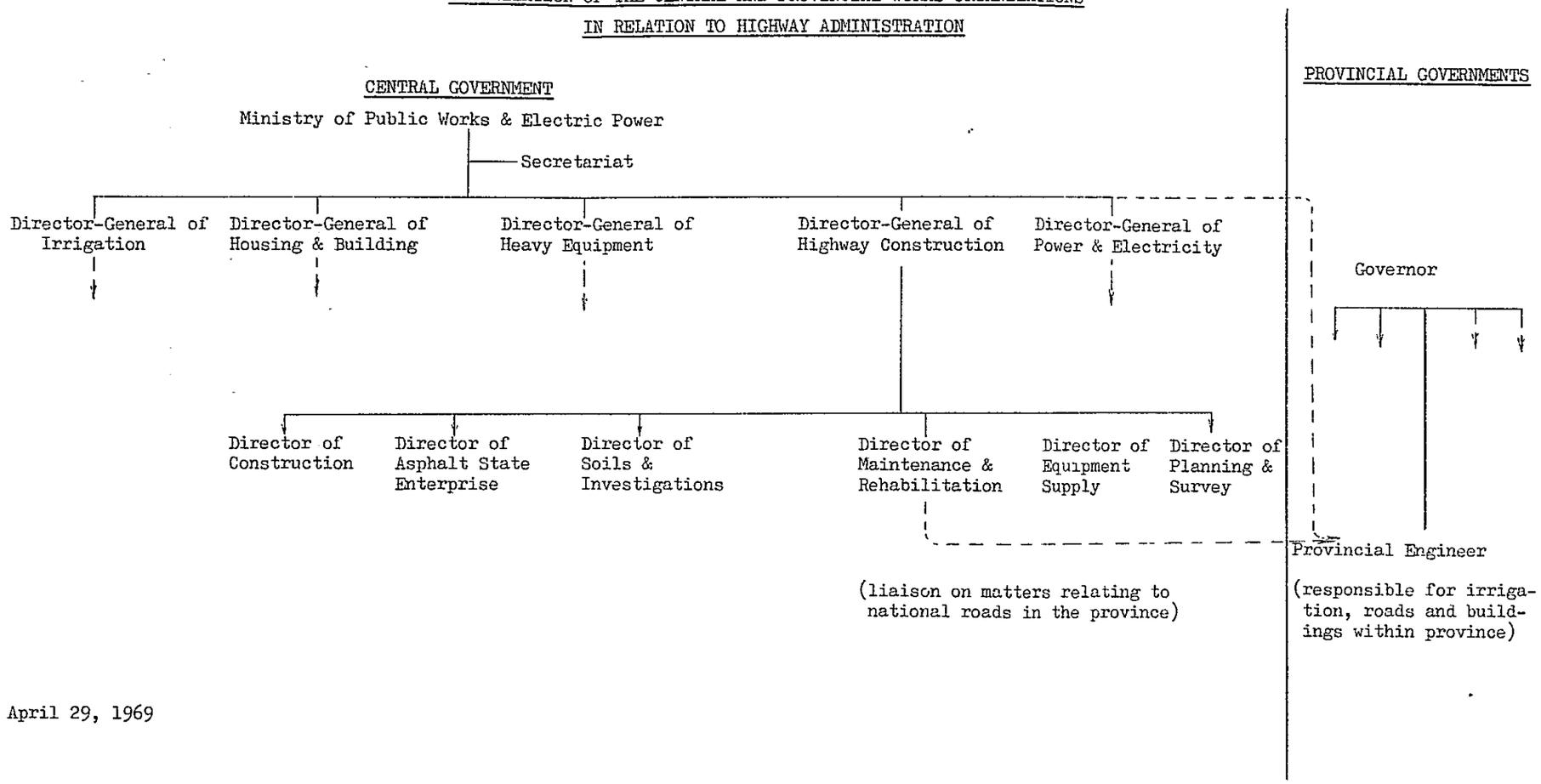
CHART

INDONESIA - HIGHWAY PROJECT

ORGANIZATION OF THE CENTRAL AND PROVINCIAL WORKS ORGANIZATIONS

IN RELATION TO HIGHWAY ADMINISTRATION



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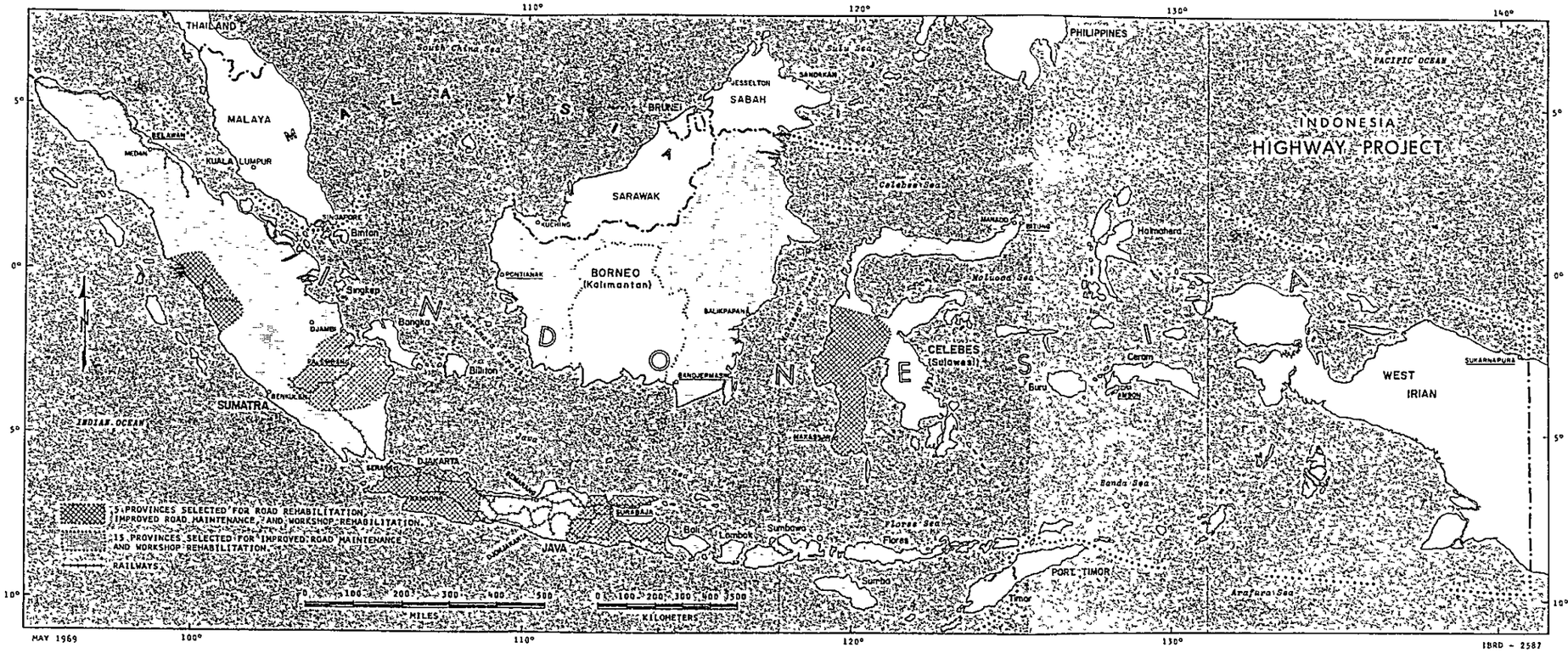
HIGHWAY PROJECT



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