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CLASSIFICATION
PROJECT EVALUATION SUMMARY (PES) - PART I

Report Symbol U-447

<p>1. PROJECT TITLE</p> <p style="text-align: center; font-size: 1.2em;">Jagorawi Highway Construction</p>	<p>2. PROJECT NUMBER</p> <p style="text-align: center; font-size: 1.2em;">497-H-031</p>	<p>3. MISSION/AID/W OFFICE</p> <p style="text-align: center; font-size: 1.2em;">Indonesia</p>
<p>4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Center, Fiscal Year, Serial No. beginning with No. 1 each FY)</p> <p style="text-align: center;"><input type="checkbox"/> REGULAR EVALUATION <input type="checkbox"/> SPECIAL EVALUATION</p>		

<p>5. KEY PROJECT IMPLEMENTATION DATES</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">A. First PRO-AG or Equipment FY <u>74</u></td> <td style="width: 33%;">B. Final Obligation Expected FY <u>74</u></td> <td style="width: 33%;">C. Final Input Delivery FY <u>80</u></td> </tr> </table>	A. First PRO-AG or Equipment FY <u>74</u>	B. Final Obligation Expected FY <u>74</u>	C. Final Input Delivery FY <u>80</u>	<p>6. ESTIMATED PROJECT FUNDING</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">A. Total</td> <td style="width: 33%;">\$ <u>53.5 M*</u></td> </tr> <tr> <td>B. U.S.</td> <td>\$ <u>26 M</u></td> </tr> </table>	A. Total	\$ <u>53.5 M*</u>	B. U.S.	\$ <u>26 M</u>	<p>7. PERIOD COVERED BY EVALUATION</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">From (month/yr.)</td> <td style="width: 50%;">2/78</td> </tr> <tr> <td>To (month/yr.)</td> <td>2/79</td> </tr> <tr> <td colspan="2">Date of Evaluation Review</td> </tr> <tr> <td colspan="2" style="text-align: right;">6/7/79</td> </tr> </table>	From (month/yr.)	2/78	To (month/yr.)	2/79	Date of Evaluation Review		6/7/79	
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B. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., telegram, EPAR, PIO, which will present detailed request.)	E. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
<p>USAID schedule an economic impact evaluation study on Jagorawi Highway 3 years hence.</p> <p style="margin-top: 20px;">*GOI is providing \$27.5 M equivalent in local funds from their own sources.</p> <p style="margin-top: 20px;">Mr. Walter G. Bollinger, DD Mr. Leslie C. Koski, P.O., PTE Mr. Robert E. Davis, PTE Mr. Robert Bourquein, OMF Mr. John P. Zedalis, DS/ENGR (ASIA/PD) Ir. Soemarga, Director of Construction, Bina Marga Ir. Hendro Moeljono, Proj. Mgr. Bina Marga Mr. B. Strough, EIC, Ammann & Whitney/Trans Asia</p>	PTE	June 1982

<p>9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;"><input type="checkbox"/> Project Paper</td> <td style="width: 33%;"><input type="checkbox"/> Implementation Plan e.g., CPI Network</td> <td style="width: 33%;"><input type="checkbox"/> Other (Specify) _____</td> </tr> <tr> <td><input type="checkbox"/> Financial Plan</td> <td><input type="checkbox"/> PID/T</td> <td>_____</td> </tr> <tr> <td><input type="checkbox"/> Logical Framework</td> <td><input type="checkbox"/> PID/C</td> <td><input type="checkbox"/> Other (Specify) _____</td> </tr> <tr> <td><input type="checkbox"/> Project Agreement</td> <td><input type="checkbox"/> PID/P</td> <td>_____</td> </tr> </table>	<input type="checkbox"/> Project Paper	<input type="checkbox"/> Implementation Plan e.g., CPI Network	<input type="checkbox"/> Other (Specify) _____	<input type="checkbox"/> Financial Plan	<input type="checkbox"/> PID/T	_____	<input type="checkbox"/> Logical Framework	<input type="checkbox"/> PID/C	<input type="checkbox"/> Other (Specify) _____	<input type="checkbox"/> Project Agreement	<input type="checkbox"/> PID/P	_____	<p>10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT</p> <p>A. <input type="checkbox"/> Continue Project Without Change</p> <p>B. <input type="checkbox"/> Change Project Design and/or <input type="checkbox"/> Change implementation Plan</p> <p>C. <input type="checkbox"/> Discontinue Project</p>
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<p>11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Name and Title)</p> <p style="text-align: center; font-size: 1.2em;">See above</p> <p style="margin-top: 20px;">Clearance: PRO:RFZimmerman PTE:REDavis</p>	<p>12. Mission/AID/W Office Director Approval</p> <p>Signature <i>R. Cohen</i></p> <p>Typed Name Raymond Cohen, A/DIR</p> <p>Date 8/30/79</p>
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JAGORAWI HIGHWAY CONSTRUCTION - PES

13. SUMMARY - The Jagorawi Highway Project provided for the construction of a totally new four-lane divided limited access highway, 47 kilometers in length with a 3 kilometer spur to Bogor. The highway begins at the southern limits of Jakarta, runs east of the city of Bogor and terminates at Ciawi, where it connects to an existing national highway. Two loans were made to the GOI to finance the engineering design, supervision of construction and actual construction of the highway. The first loan (497-H-021) for \$800,000 was used to finance the engineering design and the second loan (497-H-031), in the amount of \$26.0 million financed the supervision and construction costs. GOI local currency additions to Loan 497-H-021 were approximately US \$300,000 equivalent and US \$27.5 million equivalent to Loan 497-H-031. Acquisition of Right-of-Way cost the GOI an additional US \$9.0 million equivalent.

The Jagorawi is finally becoming a reality after many years of hard work and dedication by Bina Marga, USAID, the US Consultant, Ammann & Whitney/Trans Asia and the Korean contractor, Hyun Dai. Beset with problems-financial, technical, performance - almost from the very beginning, there was almost no project. Some of the incidents, such as the erroneous and inadequate plans produced by the first consultant, Sverdrup and Parcel International (SPI) were potentially disastrous to the project. Only a major crash-effort mounted by the follow-on consultant, Ammann and Whitney/Trans Asia, averted huge construction claims. During the bidding stage, Invitation for Bid (IFB) documents prepared by SPI were rejected and later substantially revised by AID engineers themselves to meet deadlines. The award of the construction contract became a reality only by the prodigious efforts of all concerned, as original bids by one US firm and the Korean firm were rejected as too high, necessitating redesign and restructuring of the project to bring it within available funds.

The Jagorawi Highway Project, from conception to completion, took almost exactly a decade to achieve. Commencing with exploratory discussion between the GOI and AID in November 1969, a loan for the engineering design was consummated in August 1970. The design contract with SPI was signed in March 24, 1971 but did not become effective until August 2, 1971 when the L/C was opened. However, serious design work did not start until January 1972 and final contract documents were delivered to AID and Bina Marga on October 15, 1972, i.e., 3 months late on a

10½ month design schedule. IFB documents were sent to pre-qualified bidders in April 1973 and bids were received in June 1973. After time-consuming negotiation, a construction contract was awarded to Hyun Dai on December 20, 1973. Because of SPI's poor performance during the design phase, Bina Marga instead selected Ammann and Whitney/Trans Asia to provide supervision of construction services and signed a contract with them in May 1974, although actual professional services were provided starting in January 1974. Hyun Dai commenced construction work in April 1974.

As of the end of May 1979, the project is virtually complete, with only the North-bound Ciawi link remaining to be finished and opened to traffic. Section B of the roadway, between Cibinong and Jakarta was formally opened by President Soeharto on March 9, 1978. The southern part, Section A was subsequently opened to traffic on April 19, 1979. Traffic volume on the new road has thus far exceeded forecasts and is expected to maintain this trend. The project has provided Indonesia with a badly needed facility comparable to the interstate roadways in the US, is one of the finest in Southeast Asia, and is considered a showcase highway by the GOI.

The original project provided for 4-lane divided segment between Bogor and Ciawi (approx. 10 Km), which was reduced to 2-lane during contract negotiations. The GOI has now decided to reinstate the deleted 2 lanes and pay for the construction from their own funds. A.I.D. has agreed to finance the foreign exchange costs for the engineering design and supervision of construction of the additional two-lanes out of remaining 031 loan funds.

14. EVALUATION METHODOLOGY - This evaluation has been largely conducted by AID personnel on the basis of their personal experiences and observations during the course of the project, and upon references such as the Capital Assistance Paper, Performance Evaluation Report, Monthly Progress Reports, Special Trip Reports, the Contract Documents, and the voluminous correspondence accumulated over the years. In addition there have been numerous consultations with Bina Marga, the Consultants, and the Contractor, as well as extensive review of relevant project documentation. Besides these participants, other AID offices such as the General Counsel, Office of Commodity Management, and the Internal Inspection Staff, were involved at various times.

Undertaken prior to the New Directions Mandate, the Jagorawi Highway spans both the old and new AID assistance policies. Originally conceived to alleviate the severe traffic congestion in the Jakarta-Bogor-Ciawi corridor, thus enhancing contiguous

industrial and commercial development with the attendant creation of greater employment, it is too early to accurately measure to what degree these aims have been achieved.

Other purposes of this evaluation are to assess the monitoring controls exercised by AID, the expertise required in projects of this type, the capacity and capability of host-country entities and personnel to implement, the need for timely actions, and the training value.

15. EXTERNAL FACTORS - Many external factors have affected this project. Some of the more significant ones are:

a. The lengthy amount of time it took AID to issue the letter of commitment (2 months) and the Indonesian Bank to issue a letter of credit (another 2 months) thus delaying the first consultant's (SPI) full mobilization. Although not the major reason for SPI's subsequent delays and poor performance, work progress was hampered by lack of the L/C for equipment procurement and subcontractor payments.

b. SPI's home office support was very poor. They failed to respond to their field team's pleas for help and further declined to be fully responsible for their subcontractors' performance, particularly in regard to Teledyne's aerial photogrammetry and URS's traffic and economic evaluation reports. The failure of SPI management to provide timely and qualified professional design help and unwillingness to monitor subcontractor's work ultimately proved to be a major contributor to their poor performance and erroneous productions.

c. SPI's project management was generally ineffective in working with Borrower personnel. The consultant employed two project managers on different work phases of the project. During the design phase SPI's project manager disagreed on several technical issues and less than satisfactory rapport was reported by the Borrower. However, this poor rapport may have been influenced by pressures caused by slow home office response to logistical needs and, as it was ultimately revealed at the start of construction, of known errors in the surveys.

d. SPI's poor performance during the design phase led to their ultimate rejection for the follow-on supervision of construction services. The switch to another consultant for supervision is a very rare occurrence and certainly disrupted the project implementation sequence.

e. The award of the construction contract to Hyun Dai, a Korean firm, was the largest ever awarded to a Code 941 country, and the first of a large capital project of this type. Throughout a good part of the contract, Hyun Dai literally struggled to get the work done. Their highway construction experience was marginal, their job management was uncertain and disagreed at times, and they were not very well acquainted with US specifications. As the contractor "learned", his work efficiency became better and there was an obvious determination to finish the job in a quality manner. The actual construction time for the entire highway was 61 months, or 6 months more than the originally scheduled completion time.

f. Many technical problems cropped up during the course of the work. All of these were solved in due fashion though not without some harried moments. The biggest problem, of course, were the survey errors by SPI which were not revealed until the start of the construction layout, and necessitated redesign of almost the entire highway. Early in the construction, it was also found out that the specified lime stabilization of base would not work and the pavement structure had to be redesigned.

g. About halfway through the project, the GOI decided to make the Jagorawi a toll highway. Many design changes had to be made. Grades had to be changed, alignments adjusted, drainage structures lengthened or relocated and pavements widened to accommodate the toll plazas. Also, additional lighting and signing had to be added. The highway traverses some of the worst soil conditions in the world and special techniques were introduced, as well as a free-draining gravel base to assure water run-off. The first asphalt concrete paving machines used by the contractor were incapable of producing a smooth riding pavement and machines with electronic sensors had to be brought in.

h. The source and origin of goods and services procured for the Jagorawi project were required to be countries included in AID Geographic Code 941. Shipment on Code 941 vessels was authorized for AID financing, provided that at least 50% of the shipments were made by US carrier. In an AG audit, it was found that during the first 1½ years of the project, only 18% of total AID financial commodities had been shipped on US vessels. Considerable disputes also arose in the case of contractor-owned equipment (used or newly purchased), concerning their eligibility for use on project. As of this evaluation, an audit is being prepared by AID Regional Audit Group, Manila, covering these items.

16 & 17. INPUTS AND OUTPUTS - USAID provided a loan of \$26 M for construction of the highway. Current estimated total cost of the highway is \$53.5 M. The GOI is making up the difference.

In the beginning the original construction contractor manager refused to add additional required equipment to the job site. Pressure from USAID and the GOI forced the contractor to change managers and add the necessary additional equipment to the project.

The pavement design had to be changed from a lime stabilized base to a 15 Cm crushed aggregate base because (1) the required quality of lime was not available locally and (2) the contractor was unsuccessful in mixing a lime stabilized base.

The original consultant in charge of design made many serious errors in the design of the highway because of errors in survey. This required the new consultant to spend many man-months or redesign of the project to correct those errors, which in turn has added to the cost of the project.

The supplier of the paving equipment gave little if any support to the contractor on the operation and maintenance of the paving equipment even though the contractor was willing to pay for the services. Many paving problems could have been avoided had the necessary expertise from the paving equipment manufacturer been on site to advise the contractor on maintenance and operation of the equipment.

As mentioned in Item 15, the conversion from a freeway to a toll system has had adverse effects on the project. This required numerous design changes, causing delays in progress and increasing overall costs substantially. Fortunately, the GOI is committed to covering all costs attribute to conversion to a toll system.

18. PURPOSE - As stated in the CAP (February 1973), "The proposed Jakarta-Bogor-Ciawi Highway project will contribute to fundamental U.S. objectives in Indonesia by improving the efficiency and reducing the economic cost of transportation of people and commodities in densely populated West Java. It will be a significant improvement of the transportation infrastructure supporting the growth of private industry in the Jakarta-Bogor corridor. Industrial and commercial development stimulated by this highway will absorb and utilize unemployed or underemployed laborers and increase income".

The Jagorawi Highway is an important link in Java's surface transport network and has already greatly improved through-transit in the heavily congested Jakarta-Bogor corridor. During the first year of operation on Section B, the traffic growth

rate was 56% as compared to the feasibility estimate of 10% per year. Ultimately, the highway is expected to handle over 30,000 vehicles per day.

19. GOAL/SUB GOAL - The Sector Goal of the GOI is to develop and construct an inter-urban toll system for West Java. Upon the completion of the Jagorawi Highway, it will become the first link in the Interurban Toll System. Two other links, Jakarta-Cikampek and Jakarta-Tangerang will be added to the toll system of West Java. The design of the Jakarta-Cikampek link has been completed and Jakarta-Tangerang link is currently being designed.

Because of the general overall poor condition of the existing 33,000 Km road network in Indonesia, Bina Marga (GOI Highway Dept.) has had to allocate approximately 75% of their budget for re-habilitation, upgrading and betterment of existing roads with only 25% remaining for construction of new roads and highways. This means that only one or two major highway projects could be realized during the Pelita II period, with needs for new roads and highways in virtually all regions of the country and the existence of regional imbalance in economic opportunities open to respective regional population and sectoral population groups.

In order to increase the financial and economic support of the poorer regions, the GOI has felt that people in those regions which are better-off could be asked to pay for new public facilities and services or at least a portion of such costs. To further this goal the GOI is implementing an Interurban Toll System for West Java.

A sub-goal of the project was to develop the capabilities and skills of Bina Marga personnel to administer, manage and implement large highway projects. At the approximate mid-point of the project (December 1976), 111 Bina Marga Staff (professional, administrative, and technicians) were assigned to the project. In addition, the contractor employed 1,098 Indonesian workers in various capacities as foremen, clerks, surveyors, electricians, mechanics, equipment operators, truck drivers and carpenters. During the course of the work, the contractor frequently complained that as soon as he trained an Indonesian, that person soon quit for a better paying job elsewhere. Thus, the employment directly generated by the project, and the training benefits derived, both by Bina Marga and Indonesian workers employed by the contractor are, by any measure, substantial. Bina Marga in particular feels that their managerial and technical capabilities have been greatly enhanced by the project.

20. BENEFICIARIES - The people in West Java will benefit directly and indirectly from Jagorawi. Besides greatly improving transport efficiency through the Jakarta-Bogor corridor, it will promote increased commerce and suburban residential development in the area.

The most direct benefit of Jagorawi is to its users, both in time and safety. Travel time between Jakarta and Bogor is now 30 minutes or less as compared to the one hour or more it used to take over the old road. Despite some early high-speed accidents, the potential safety of the Jagorawi is already evident. In the first year of operation of Section B, there were 106 accidents reported, with 137 minor injuries and 8 fatalities. On the old road, during a less congested 3-month period in 1971, there were 342 severe accidents in which 127 died, 55 badly injured and 70 slightly injured.

Increased tourist travel, particularly on weekends, also appears to be having significant impact on catering businesses in the Bogor/Ciawi area. A new cement plant at Cibinong is already in operation and further expansion is planned. Other signs of increased commercial activity in the highway corridor are evident.

The original rate of return estimated for this project was 22%. In 1975, a benefit-cost analysis conducted by the UNDP, indicated an IRR of 33%. Bina Marga has expressed great interest in an in-depth post-project economic impact study to quantify the direct and indirect benefits resulting from the construction of Jagorawi. It is recommended that A.I.D. assist the GOI in this study, along with a technical evaluation of the highways performance, about three year hence.

21. UNPLANNED EFFECTS - The design of the highway provides for a pedestrian crossing at 1 Km intervals either by underpass or vehicular bridge. The highway is designed to be a limited access highway. Unfortunately, in the beginning nearby residents desiring access to the opposite side of the highway cut the fencing on both sides of the highway. They apparently did not have any idea of the danger in crossing a high-speed super highway. Bina Marga tried to placate the residents by offering to construct a parallel service road outside the highway. This proposal was not successful. Bina Marga has had a series of discussions with local leaders of people residing near the highway pointing out the need for keeping pedestrians, animals, becaks, etc. of the highway. These discussions have been partially successful inasmuch as there was a partial decline

in the incidence of fence cutting on the highway. Bina Marga is now constructing 5 pedestrian overpass bridges in the highly populated areas near the highway to accommodate pedestrian cross-traffic.

It should be noted, however, that the design of the highway did take into account the irrigation canals and waterways crossing the highway. These crossings were accommodated by bridges, box culvert, pipe culverts and in some cases by inverted siphons. There has been no interruption of agricultural activities dependent on existing sources of water.

With the opening of the Jagorawi Highway, land prices in the Bogor-Ciawi area have risen considerably. Jakarta is now within commuting distance of these areas. The highway is encouraging the development of housing and industry in the Bogor-Ciawi area.

This project introduced a new cost-saving technique in bridge construction with the introduction of mass-produced precast prestressed concrete bridge beams. In the span range from 15 to 30 meters it was found that the cost of the bridge superstructure utilizing precast prestressed concrete beams was far less than cast-in-place reinforced construction or steel-concrete composite construction or steel truss construction. The cost savings per meter of bridge superstructure amounted to almost 2 million rupiahs/linear meter of bridge. The GOI plans to utilize this cost-saving technique on future highway bridge construction.

22. LESSONS LEARNED

1. That in an LDC like Indonesia, where industrialization is emphasized, and transport problems are acute, selected capital projects like Jagorawi may be a key element to economic development.

2. The Toll System initiated by the GOI on this project taxes the segment of population that can most afford to pay for a highway of these high standards. The revenue derived from the tolls make funding available for maintenance of the highway plus funding for new highway construction in other parts of Indonesia.