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METHODOLOGY FOR ACHIEVING COST REDUCTIONS IN PUBLIC CONSTRUCTION – THE COLOMBIA PHASE

interim report to the

AGENCY FOR INTERNATIONAL DEVELOPMENT

OCTOBER 1972

PD-ABF-375

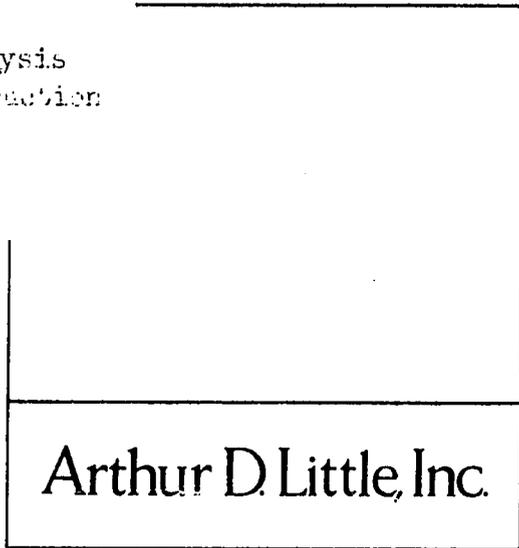
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Methodology for Achieving Cost Reductions in Public...

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624.1013 Little (Arthur D.), Inc. NTIS
L778a Methodology for Achieving Cost Reductions
in Public Construction - the Colombia Phase;
Interim Report. Oct. 1972.
54 p.

1. Construction industry - Colombia. 2. Cost analysis
- Construction projects - CO. I. Title. 3. Construction
projects - CO.



PDABF-375

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AGENCY FOR INTERNATIONAL DEVELOPMENT
October 1972

Arthur D Little Inc

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PREFACE

This is an interim report, and its purposes are to present results that have been achieved so far from the operations of the project in Colombia, the first of the three countries selected, and to use them as a basis for planning the work in the second country, the Philippines. The Colombia work extended over a period between late September 1971 and mid-September 1972, the bulk of the effort being expended during four periods of residence in Bogota beginning in December 1971.

The work content anticipated in the Philippines is outlined in a tentative project statement, produced as a result of a reconnaissance visit during 26 June to 15 July, and submitted by ADL to AID attached to a letter dated 15 July 1972. Active field work in Manila is scheduled to begin in early November and to require a continuous four-month period for completion.

The third country is as yet not identified. Accordingly, there has been no activity so far in this respect.

I. SUMMARY

A. PROJECT GOALS

The Agency for International Development (AID) is interested in assisting organizations in developing countries, concerned with civil engineering projects financed by local government agencies, to achieve materials research and adaptation projects which will reduce short-term costs and long-term drain on national budgets. This interest extends not only to identifying opportunities for cost reductions of this type, but also to achieving the benefits from their implementation. For this reason, the results from assistance should provide an impetus whereby developing countries can take further measures, where these are necessary, to achieve the desired benefits with or without the participation of external assistance agencies.

Accordingly with such an interest in mind, AID requested Arthur D. Little, Inc. (ADL) to undertake a project having the following specific goals:

- to develop a methodology for application in developing countries which is aimed at achieving cost reduction opportunities based on materials of construction.
- to test the elements in the methodology by applying them in projects to be carried out in three countries to be selected by AID.

While accomplishing these goals, ADL is to pay equal attention to the technical aspects and to the institutional and social barriers to the acceptance of the results which may exist within each country.

B. SCOPE OF ACTIVITIES

The scope of activities foreseen in order to achieve the project goals is a technical one and includes the following:

1. Identify, formulate, and carry out materials research and adaptation projects which will reduce short-term costs and long-term drains on national budgets.
2. Focus on locally-available materials, or those which are the least expensive to import yet yield a high efficiency in performance.
3. Make a current assessment of the state of construction materials technology and research opportunities.
4. Upgrade the ability to analyze not only the technical problems but also the institutional and social barriers to the utilization of improved materials.
5. Develop a technical basis and provide an impetus for
 - a. undertaking the most appropriate materials projects;
 - b. improving the capabilities of local engineers and institutions in the analysis, testing, research, and innovation aspects of materials technology; and
 - c. encouraging both government and private industry to adopt the concepts of cost reduction and value engineering.
6. Clarify the types of adaptive research and other action programs offering the most promise of making a significant impact in the field of materials technology.

C. METHODOLOGY

In developing the methodology for achieving cost-reduction opportunities, ADL was to approach the work with the following principles in mind.

1. Work within the administrative structure set up for the project.
2. Provide assistance to organizations in developing countries concerned with civil engineering projects financed by local government agencies.
3. Focus on those areas that promise the maximum effect on reducing costs, on improving balance of payments, and on showing a good potential for penetrating institutional impediments.
4. Place equal emphasis on
 - a. the identification of technological opportunities, and
 - b. the techniques of penetrating the industrial sector with improved technology.
5. Assist local institutions to clarify gaps and weaknesses, to identify priorities, and to formulate action plans.

Accordingly we began the work in Colombia with a tentative methodology already identified from these principles. The procedure contemplated was the following:

1. Detailed Project Planning. Undertake beforehand a program of literature research, consultation with knowledgeable people, and identification of technical organizations in each of the three countries to provide background for planning the details of the work.

2. Reconnaissance. Travel to each of the three countries for the purpose of establishing the administrative base for the project, identifying sources of information, selecting counterpart personnel, and establishing the general project schedule.
3. Information Gathering and Evaluation. Undertake a concerted effort to collect the information and data that will assist the counterpart technical and government personnel to assess the current state of materials technology for public works in accordance with the scope of the activities. The papers to be prepared are basically to be informational and related to the demand, supply and conversion aspects of materials.
4. Analysis and Conference Planning. The principal objective is to assist the counterpart technical and government personnel to identify opportunities appropriate to the goals of the project and to the activities contemplated, to formulate corrective programs, and to organize effective conferences. The ultimate aim involves the holding of a conference in which an action plan will be identified that is practical to implement in order to secure the benefits indicated from the results of the work.
5. Project Review and Report Preparation. Home-office work is to be involved in which the papers prepared will be reviewed by an impartial group to ascertain if the action plan formulated is complete and defensible. Results are revised papers ready for use in a formal conference.
6. Conference Activity. The action plan is presented at a conference, the findings are discussed by the participants and replies are provided to questions raised. The results represent feedback to the formulation of the final action plan.

7. Follow up. A visit to the host country (except the last) at some time after completion of the work in that country to determine the actual results achieved from the final action plan.

Finally in the application of the methodology, we recognized that for a potential reduction in public construction costs to be meaningful, it should be considered from two points of view. From one point of view, a reduction in the actual cost of the construction is important. But, the real benefits to a developing economy may be realizable only from a second point of view, which is the consideration of the implications of such a cost reduction on the economy of the nation itself, namely: the effect on imports, or the balance of payments; the effect on the generation of new employment opportunities, and the nature of these new opportunities; and, the effect on the balance between the long-term and short-term costs of a construction project, or the effect on the soundness of the structure.

D. WORK ACCOMPLISHED TO DATE

Activities in field in Colombia have been completed as of 19 September 1972, and the results are summarized and detailed in the report UINF-T-06 of the Ad-Hoc Group set up by the counterpart organization (the Departamento Nacional de Planeacion) to undertake the project. Its title is "Achievement of Opportunities to Reduce Construction Costs in Public Works." The official version of this report in Spanish is currently being produced by Planeacion, using the English version as the basis. The report can serve three purposes:

1. It is the basis upon which decisions on the actions recommended can be taken and implementation undertaken accordingly.

2. It is a guide should the counterpart organization continue the efforts to find new cost reduction opportunities through more detailed effort.
3. It contains assumptions that should be confirmed as the result of the research efforts recommended.

The work in Colombia resulted in identifying fourteen actions. Implementation of four of these has already begun; decisions from the Planeacion management (but more likely from the Council for Economic and Social Development whose chairman is the President of Colombia) are required before four other actions can be implemented; while implementation of the remaining six actions should be deferred until an appropriate time determined by the results of using a stepwise approach in prior actions, or of the completion of prior actions.

The national goals expressed in the current National Development Plan governed the selection of topics in Colombia. These goals emphasize the construction of urban housing and the associated infrastructure, with materials of construction important mostly with respect to supporting the volume of construction anticipated. ADL undertook to act in a manner that would be responsive to these goals, and, no doubt as the result, the cooperation of the counterparts in supporting and completing the project work was adequate, almost always enthusiastic, and consistent. Although the views of Planeacion have yet to be expressed in writing, there were a number of oral expressions by counterparts to ADL and/or AID personnel during meetings in the final week of the Colombia phase, which indicated that Colombian expectations so far had been fully met, but also that further activity would be an extension of the experimental nature of the project.

The prime technical focus, which is foreseen to be on materials of construction, was modified to be in accord with the Colombian expectations for the work which arose from their desire to be responsive to the goals of their current National Development Plan. Two modifications resulted, and they are

- that the focus of attention broadened to include not only materials of construction but also construction technology, and the institutional structure within which both operate; and
- that the concept of cost broadened further to incorporate implications of cost reductions on labor employment, in addition to the implications for the balance between first cost and ultimate cost and implications for the balance of payments.

Nevertheless, two major findings from the Colombian work do concern improvement in the use of indigenous materials. They are the use of the slag produced in the blast furnace of Colombia's integrated iron and steel works at Belencito (Boyaca Department), and the technological improvement in brickmaking manufacture to increase efficiency and reduce production cost. The slag material now wasted can be a raw material in the manufacture of masonry cement products to substitute for the more-expensive portland cement now used in Colombia for erecting masonry walls and partitions. The technological findings from the work in the brickmaking industry, which was assisted by a UNIDO expert through the Colombian Institute for Technological Investigations, can be useful in increasing the manufacturing efficiency of the smaller labor-intensive brick factories to make brick more competitively with concrete block.

It was not practical in Colombia to test the practicality of action plans by giving them public exposure to the participants of a conference and by evaluation of their reactions. The reason lay in the sensitivity of some of the topics and the need for the Government to have a final report for approval beforehand. The sensitivity probably arose because the Plan itself is politically controversial with different attitudes towards its implementation existing within the executive and legislative arms of the Government. Such need not be the case in the Philippines.

The counterparts in Colombia, particularly those at higher levels were involved in day-to-day routine activities in addition to their full or part-time participation in the project. Accordingly, the Planeacion management could not see the effectiveness of releasing them for an extended stay overseas at the ADL headquarters for the home-office review function. In retrospect, another reason, but unstated at the time, was the prospect that a conference would not be part of the project. As an alternative, visits to the United States were arranged for two selected counterparts to enable them to collect needed information.

E. EFFECTS ON METHODOLOGY

The work accomplished to date has resulted in a number of findings concerning the methodology originally foreseen that have shaped our plans for the work to be undertaken in the Philippines. These findings are incorporated in a revised format for the original methodology envisaged for the project. Accordingly, at this stage of the project, the following seems to be a reasonable model for the methodology.

1. Technical Approach

Focus on Materials Adaptation. This focus should remain, but it should not be allowed to obscure cost-reduction opportunities that can arise from considerations of construction technology and from possible change in the institutional structure in which materials adaptation and construction technology change would operate.

Integrated Approach to Institutional Change. The integrated approach which is discussed in the Colombia report (Sections 2 and 3 of Appendix B), has a potential of providing quickly the quantitative information such as the costs and their implications when fundamental changes in materials of construction, in technology of construction, and in institutional practices are considered. The effect of this approach is to put the burden of proof that such costs and their implications are realistic on the construction sector itself. The alternative followed in Colombia is a piece-meal approach which puts the burden of proof on the investigator, who in turn must obtain the evidence from the interests who would be affected by the results.

There is a caution, however, in that the integrated approach can provide results only in the longer term because the analytical tools are still in an early stage of development, require a difficult collection of fundamental data, and should be applied gradually in a stepwise fashion in order to gain competence and confidence in the host-country organization. The key elements are the application and integration of two mathematical models

formulated and developed primarily by the World Bank. Considerable preparation work should be undertaken in advance of the Philippine work to obtain detailed technical information for the two models and to define the constraints on their use.

2. Functions of The Host Organization

Counterparts. The project should be accomplished by a group of counterparts in which staff from the consultant organization provided by the technical assistance agency (ADL here) should participate as members. The counterparts as a group should be responsible for completion of the project, and ultimately for the preparation of the final report.

Role of The Consultant. Participation should take two forms. In the first, he should act to stimulate the activities of the counterparts because of his presence, and residence during the period of activity by one person having such an orientation is probably sufficient. In the second, he should act to provide specialized technical assistance from his staff as the nature of the topics require. The two forms of participation can be effective during different stages of the work, when practiced either simultaneously or alternatively, and there should be continuous sensitivity as to which combination of the two forms of participation is appropriate.

Influence on Work Program. The missions of the two host organizations encountered so far seem largely to influence the nature of the work program. In Colombia, the broad range of interests

of Planeacion, the planning arm of the Government, has been reflected in the work program for that country, and accordingly the depth to which investigations could be taken, given a fixed budget and time availability, has been limited. In the Philippines, the Bureau of Public Highways has a narrow range of interest, and it should be practical for the investigations to plunge into greater depth of detail. A possible danger exists, however, that the scope followed may be so narrow that the cost reduction results are not meaningful enough to sustain interest to continue the type of effort involved.

3. Reconnaissance.

This should be the first step as soon as the country and host organization in its government are defined. It occurred in the Colombia phase, and has already occurred in preparation for the work in the Philippines. A visit is then in order, but two actions beforehand are desirable. One is the designation of the project head in the counterpart organization. The other is the selection, at least in principle, of a high-level steering committee for the project which can ultimately be effective in assuring implementation of the actions recommended. A steering committee has already been identified in the Philippines. None existed for the specific purpose of guiding the project in Colombia. The objectives of the reconnaissance in the Philippines were the following:

- approval of the contents of the project statement by the steering committee,
- selection of counterpart staff responsive to the topics in the project statement,
- agreement as to beginning the data collection work immediately,
- agreement as to a project schedule and completion date.

These objectives were achieved.

In the present project, the three countries are being treated consecutively; and the reconnaissance step has been undertaken in the second country at a time when work in the first country had not yet been completed. Thus after the reconnaissance, the counterpart staff can be left alone for a period, and this fact may point to a good technique to determine early in the project the degree of self-motivation of the counterparts and interest in the project by evaluating their accomplishments while alone. If a future project involves only one country, and if such a technique is employed, a gap in the schedule of activities could by the consultant could occur at this point.

4. Information Gathering and Evaluation.

This is work that the counterparts should undertake entirely on their own, and in which the consultant serves as the stimulant. As the work proceeds, the counterparts and the assisting group should remain alert to the needs for specialized assistance, and arrangements to secure this additional assistance begun. The technique of stimulation for more rapid progress seems to involve the following factors, based on the Colombia experiences:

- The consultant's presence stimulates work by counterparts in order that they can avoid being embarrassed by nonattention;
- It enables formalized governmental organizational channels to be cut across in order to accelerate progress; and
- The consultant's presence reminds the host-country organization of their commitment to the progress schedule.

Whether such a stimulation function needs to be continuous during the project activities probably depends on the country involved. The Colombia experience indicates that intermittent presence was satisfactory. Continuous presence is planned for the Philippines.

As already noted, the Colombia experience has identified a technique for data collection that could be a powerful analytical tool to stimulate institutional change through quick access to financial or social cost effects of specific changes. The caution at this time is that considerable effort over a considerable period of time is still required before the capability of this technique becomes readily available. The approach in its use should be one of carefully planned consecutive stages.

Flexibility should be retained to provide a facility for selected qualified counterparts to travel overseas for field work appropriate to the project, especially if this is necessary because of local administrative restrictions. Such travel could be a more effective alternative to bringing specialized assistance to the field in the host country, and apparently was effective in Colombia.

5. Analysis And Conference Planning.

The analysis can be aimed in either of two directions depending on the sensitivity of the topics to publicity. It can be aimed at completion of the work with the holding of a conference or without it. The Colombian experience has shown that a number of conferences instead of one comprehensive one is desirable as the first step in implementation of the different actions, because a high-level review of the total project was required beforehand. With a steering committee already in existence in the Philippines to provide periodic guidance--a situation that did not prevail in Colombia--it seems that the original concept of holding a conference before the end of the project should be retained, so that the benefits of its feedback to the action plan can be incorporated in the final project report.

6. Project Review and Report Preparation.

On completion of the field work and the final report in the second country, the effects of the results on the methodology used should be evaluated, the appropriate changes identified, and the model for methodology amended accordingly.

7. Follow-Up.

Future activities in Colombia involve the completion of the formal report in Spanish by the counterparts and its submission for approval; and the delineation by Planeacion from among the opportunities for cost reduction now identified of its priorities for implementation. ADL plans a final visit to Colombia about July 1973, about nine months after the last field work, to determine the progress achieved by then in order to provide an input to the evaluation of methodology.

Such a procedure is contemplated for the work in the Philippines.

II. INTRODUCTION

The goal of the project is to identify methodology that can achieve reductions in the cost of public construction. Thus, in the results not only should opportunities for reducing costs be defined, but also action on recommendations concerning them should be secured. The methodology for such an achievement is to be identified in a generalized form so that it can be applied throughout the world of developing economies, and the focus of the technical activities is to be on materials of construction. The methodology is to be a practical one; that is, its character should evolve from experimental attempts to apply it in specific situation. Public construction is chosen as the area for emphasis on the reduction of costs, because much of the available resources in developing economies are channeled in this direction.

Therefore, the experiences on which the ultimate methodology is to be based will come from three experimental attempts in diverse countries having economies considered to be developing. The first of these countries has been Colombia; and, at this writing, the second is to be the Philippines, while the third is as yet unidentified.

The experiences and the results from the project activities in Colombia are contained in a separate report entitled "Achievement of Opportunities to Reduce Construction Costs in Public Works," dated September 1972. The references to details of the Colombian experiences cited below are to be found in that separate report. The purpose in this report is to evaluate the experiences in terms of their teachings with respect to methodology, and also, with respect to planning properly the work efforts in the two remaining countries, especially in the Philippines.

One experience, in effect, says that the correct solutions will be responsive to national goals. In Colombia, this has meant that the correct solutions will lead to the generation of meaningful labor employment opportunities arising out of the construction of urban housing, while at the same time they will not burden the country's foreign exchange balance. Correct solutions in reducing costs in public construction in Colombia, accordingly, should address themselves to these two goals, as well as to the goal of reducing the financial cost of construction projects.

Related to responsiveness to national goals is the concept of appropriateness of technological methods used in public construction. If the construction technology practiced in a developing country has evolved as a result of projects implemented by internationally-oriented construction firms, the methods may be capital intensive to the degree that they are not responsive to a national goal of achieving maximum employment of the people. The reverse may also be true so that capital intensiveness is almost nonexistent, and labor intensive construction schedules may accordingly be so long that lost benefits from the delay could more than adequately justify increasing the capital intensiveness of the methods employed. We have considered in our work that "appropriateness" is a quantitative balance between the two extremes cited above that satisfies national goals as they currently exist and as they could change.

The work program in Colombia, as it has been described in the Project Statement (Appendix A the Colombia report), reflects such considerations. Also, the project activities show specifically that

- the number of well-trained, competent professionals and technicians available as counterparts was remarkably large;

- responsiveness of the details of the work programs to nationalistic policies and attitudes seems to have been total; and
- awareness of the need for research is reflected in the actions recommended, as, for example, in the stepwise procedure adapted in the road and highway action plan (Section III, Colombia report) and also in the pilot-scheme approach in the unit-train concept for hauling cement in bulk (Section V).

These three observations agree remarkably with observations recently made by David B. Bell*. He calls for important modifications over the next decade in the policies and methods of operation under which technical assistance is provided by foreign aid agencies, and cites certain changes that already have occurred and the better understanding they have generated in the process of development as the justification for the modifications. Much of his paper develops the details and the implication of these changes, so that as it now appears, the paper itself might be considered as an invisible appendix of this report.

The changes that he cites are the following:

- The rapid rise in the number of well-trained, competent professionals and technicians in the less-developed countries.
- The continuing steady increase in nationalistic attitudes and policies in many developing countries.

*"On the Future of Technical Assistance," Excerpt from a book Industrial Organization and Economic Development, J. W. Markham and G. F. Papanek. Editors, Houghton Mifflin, 1970.

- The increasing awareness of the need for research in dealing with problems of economic and social development.
- The increasing convergence between many problems of less-developed countries and those of more-developed countries.

Furthermore, Bell clarifies the achievement of successful accomplishment of "technical assistance" as requiring emphasis on cooperation between professionals and technicians from advanced countries and their colleagues in developing countries in accomplishing three tasks, namely:

- designing solutions for the problems in those countries;
- providing the necessary training to produce people competent to join in such work; and
- undertaking the research, demonstration, testing, and evaluation necessary to find such solutions.

Finally, Bell points out that virtually every problem in developing countries in reality requires a novel solution, worked out in those countries to meet their particular conditions. An arbitrary transfer of a solution marked out for an advanced country may set back the evolution of answers which are the correct ones for the developing countries.

III. ACTIVITIES AND RESULTS

The activities and results from the project work in Colombia are reported below. At this writing, a tentative project statement for the Philippines has been identified, but no active field work has yet begun. The third country is not yet identified.

A. COLOMBIA

1. Activities

Figure 1 compares the planned schedule for the work in Colombia with that which actually was followed. It also shows the dates of the major events in the project that affected the method for its accomplishment. The most noteworthy of these resulted in an extension of the duration of work in the field. Active work on the project began after a joint reconnaissance visit to Colombia by AID and ADL during the week of 27 September 1971. As one result, on 6 October 1971, a schedule was planned for the further work in Colombia to begin on 29 November 1971 and to finish on 12 June 1972, incorporating the methodology already foreseen (see Section I above). The extension contemplated completion of the work on 31 August 1972. Field work in Colombia actually was completed on 19 September 1972.

The schedule was designed to be accomplished in four consecutive steps as shown in Table 1. The fifth step shown in Table 1, that of follow-up of results, has not yet occurred. This step is planned for accomplishment after the work in the second and third country is completed. Field work by the personnel of the ADL project team was scheduled to occur during stages 2 and 4 of the work.

The project schedule, as it was actually carried out is shown in Table 2. It also involved four stages, with the fifth (the follow-up)

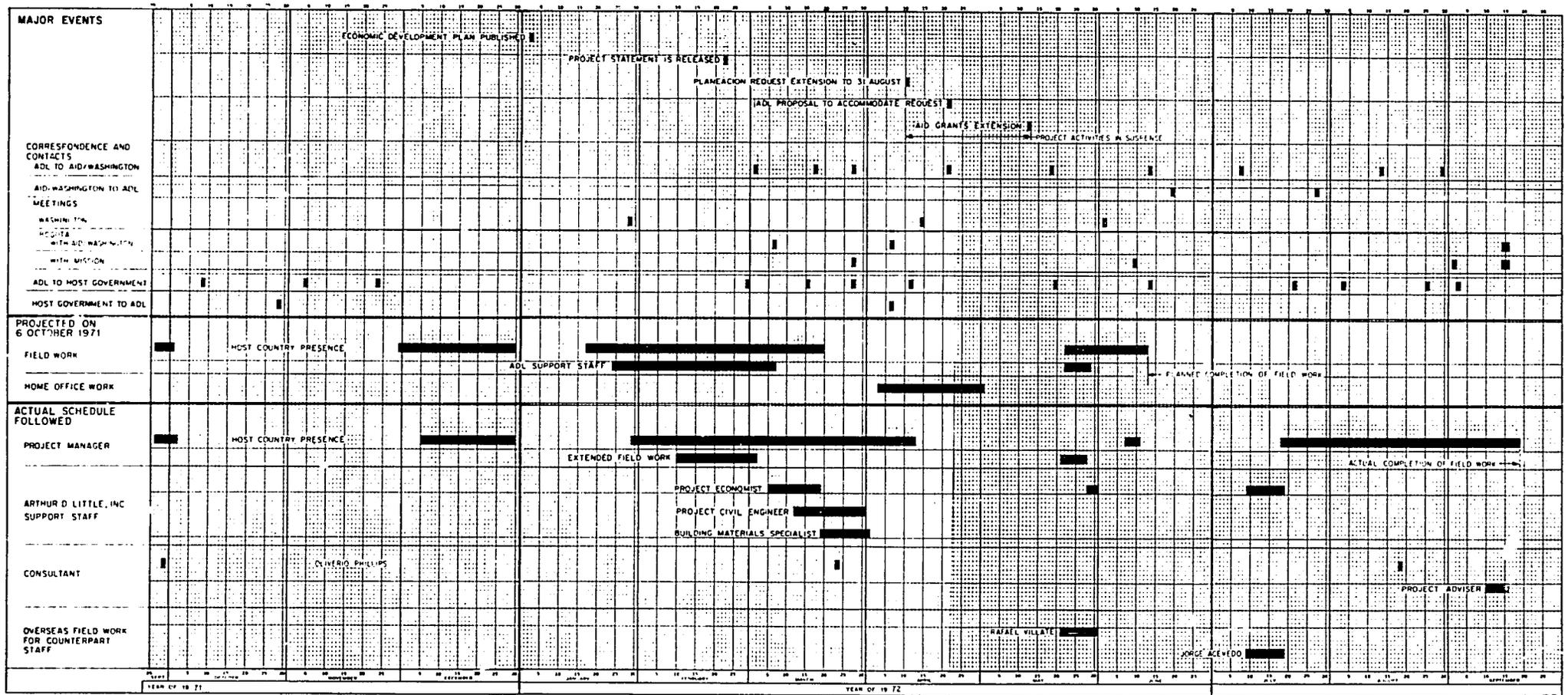


FIGURE 1 - PLANNED AND ACTUAL PROJECT SCHEDULE - COLOMBIA

TABLE 1

ORIGINAL DESIGN FOR PROJECT SCHEDULE - COLOMBIA

<u>Stage</u>	<u>Period</u>	<u>Activity</u>	<u>Location</u>
1	From 29 November 1971 to 30 December 1971	Selection of Program Topics	Colombia
2	From 17 January 1972 to 20 March 1972	Information Gathering, Analysis, and Evaluation; Conference Design and Preparation of Papers; Schedule and Tentative Program for Conference	Colombia
3	From 10 April 1972 to 1 May 1972	Action Plan Preparation and Review; Formal Conference Program Adoption	ADL Home Office (Cambridge, Mass.)
4	From 22 May 1972 to 12 June 1972	Conference and Reporting	Colombia
5	For the Future (July/August 1973)	Follow Up of Results of Implementation	Colombia

TABLE 2
THE ACTUAL PROJECT SCHEDULE - COLOMBIA

<u>Stage</u>	<u>Period</u>	<u>Activity</u>	<u>Location</u>
1	From 5 December 1971 to 30 December 1971	Attempt to establish a project statement and to avoid division of the project into two separate units.	Colombia
2	From 29 December 1972 to 13 April 17, 1972	Publication of a formal report statement and the undertaking of intensive field work by the project team. Activities stopped when Colombia requested time extension.	Colombia
3	From 7 June 1972 to 11 June 1972	Brief visit to insure that activity was continuing and that report writing would be completed on time.	Colombia
4	From 18 July 1972 to 19 September 1972	Wind up activities to produce action plans and host-country report.	Colombia
5	For the future July/August 1973	Follow-up visit to assess the results of the Action Plan.	Colombia

to come. All stages were carried out in Colombia, in contrast to the original plan (Table 1) in which stage 3 was to be carried out at ADL headquarters. Nevertheless, as shown in Figure 1, two visits were made to the USA by counterpart personnel from the Colombian Government for necessary field work, part of which was done at ADL headquarters. Also shown in Figure 1 is the liaison between ADL and AID (both Washington and the Mission in Bogota) in the form of correspondence and meetings, and between ADL and the Colombian Government.

The events which significantly affected the results and the manner in which the project work in Colombia was completed, were the following:

1 January 1972	publication of a new National Development Plan for Colombia
22 February 1972	publication of the Project Statement for the work
10 April 1972	request of AID by the Colombian Government to extend the work through 31 August 1972
21 April 1972	ADL proposal to AID to accommodate the request of the Colombian Government
12 May 1972	AID approval to extend the work.

Accordingly, project work was essentially in a state of suspense between the period 13 April and 12 May 1972.

2. Work Program

The work program was set forth in some detail in the Project Statement (Appendix A of the Colombian Report) as five topics. These are summarized in Table 3. Two topics were devoted to materials of construction

TABLE 3
INITIAL WORK PROGRAM

<u>Reference*</u>	<u>Title</u>	<u>Objectives</u>
3.1 (Page 7)	The Colombian Cement Industry	Identify alternative technical-economic methods by which industry can expand its capacity and the implications of each method with respect to the objectives of the National Development Plan
3.2 (Page 10)	The Production and Distribution of Burned-Clay Products	Identify alternative policies within which the expansion of the industry may occur, and the implications of each to achieve the objectives of the plan.
3.3 (Page 12)	Roads and Highway Construction and Maintenance	Information gathering and evaluation in selected topics appearing to offer significant potential for cost reduction.
3.4 (Page 15)	Technological and Cost Aspects of Vertical, Multi-Unit Housing--A Case Study	Analyse actual examples of urban housing construction and determine the role played by the state in their implementation. Also, identify alternative roles for the state and the implications of each on the objectives of the plan.
3.5 (Page 17)	Technological and Cost Aspects of Future Urban Infrastructure Construction	Compile technological and cost data concerned with urban infrastructure construction for use as a quantitative tool in the analysis and optimization of new urban housing projects.

* Details are given in Appendix A of the Colombia Report beginning on the pages noted.

(cement and brick), two were devoted to infrastructure construction (primarily in roads and highways), and one topic to urban housing (the major construction emphasis in the National Development Plan for Colombia).

The work program set forth in the project statement was accomplished essentially completely, the one important exception being the fifth program with respect to urban infrastructure.

3. Counterpart Staff

The administrative structure within which the project operated in Colombia was that of the Departamento Nacional de Planeacion, the planning department of the Colombian Government. Its chief (Dr. Roberto Arenas B.) reports directly to the president of the country, and is a member of the Council of Economic and Social Development, whose chairman is the country's president.

Planeacion's organization divides at the top level into a number of distinct and somewhat autonomous units. The project was located in the Unit of Infrastructure (UINF) whose chief was the counterpart of the ADL project manager. But the materials topics were the interest of the Unit of Industry and Agrarian Studies (UEIA). The activities of Planeacion in urban development and housing construction are not formalized as a unit in the legal sense that the decree which established Planeacion recognizes the functions of a unit. The housing topic, accordingly, was the concern of a Division of Urban and Housing Development.

The counterpart staff in Colombia, and its character, is shown in Table 4. Almost all of the staff were members of Planeacion, although some assistance was obtained from the Ministry of Economic Development and the Ministry of Public Works. Planeacion retained the services of the Colombian firm of Londono y Velasquez at its own cost to assist in the studies concerned with urban housing. Planeacion also secured the services of a UNIDO consultant and his counterpart working

TABLE 4
COUNTERPART STAFF

<u>NAME</u>	<u>POSITION</u>	<u>FUNCTION</u>	<u>PERIOD</u>	<u>REMARKS</u>
<u>Planeacion</u>				
Eduardo Villate B.	Chief, Unit of Infrastructure	Counterpart to ADL Project Manager	Sept 1971 to June 1972	Left Planeacion to assume new position as chairman of the Fund for Savings and Housing (FAVI) the implementing arm of the new Colombian government policy of establishing constant value savings and loans for financing housing construction in accordance with the goals of the National Development Plan.
Alfonso Sanchez	do	do	June 1972 to present	Replaced Eduardo Villate
Jorge Acevedo	Chief, Division of Transport, Unit of Infrastructure	Assistance for day-to-day activity	Sept 1971 to Sept 1972	Concerned on a part-time basis with overall policy matters as a representative of Villate/Sanchez. Traveled to the USA for field work.
Horacio Jaramillo	Division of Transport, Unit of Infrastructure	Full time participation with emphasis on infrastructure topics	January 1972 to July 1972	Left in July 1972 to attend a Masters program at Stanford University under AID sponsorship.
Ernesto Murillo	do	do	July 1972 to present	Replaced Horacio Jaramillo
Rafael Villate	Chief, Division of Urban and Housing Development	Major time participation, originally on materials of construction topics, and later (August 1972) on housing topic.	January 1972 to present	In the short period of time of association with the project, rose from a technician in the Unit of Industrial and Agrarian Studies to the Chief of a major Planeacion activity. Traveled to USA for field work.
Fernando Sandoval	Unit of Industry and Agrarian Studies	Technological and cost aspects of the cement industry	January 1972 to July 1972	Chemical Engineer who had worked in the plant of one of the cement companies before joining Planeacion.
Luis Fernando de Guzman	Division of Urban and Housing Development	Full time participation at two stages in the work for the housing topic	Dec 1971, April 1972 to Sept 1972	Gap in participation occurred because of internal administrative differences in Planeacion regarding the housing topic.
John Naranjo	Chief Division of Industry, Unit of Industry and Agrarian Studies	Major time participation in the Materials topics	July 1972 to present	Replaced Rafael Villate
Mary de Garcia	Project Secretary	Special hire for project at a rate higher than prevailing.	January 1972 to September 1972	Not English speaking, was secretary to a former Mayor of Bogota.

Table 4 (Continued)
Counterpart Staff

<u>NAME</u>	<u>POSITION</u>	<u>FUNCTION</u>	<u>PERIOD</u>	<u>REMARKS</u>
<u>Ministries</u>				
Jaime Fernandez	Ministry of Economic Development	Field work in cement topic	February 1972 to March 1972	Was a member of the party for field trips to the Colombian cement plants
Francisco Almansa	Ministry of Public Works	Infrastructure Topic	Various to April 1972	Assisted Horacio Jaramillo
<u>Other</u>				
Londono y Velasquez	Local Consultant	Housing Topic	April 1972 to present	Retained by Planeacion to assist the Division of Urban and Housing Planning with the cost analysis work of current housing projects and the evaluation of institutional practices.
B. M. Sedalia	UNIDO/Vienna	Brick Industry	March and April 1972	UNIDO expert assisting the Institute for Technological Investigations in the Colombian brick industry. Planeacion arranged for part time assistance from him during his stay in Bogota.
Antonio Paredes	Institute for Technical Investigations	Brick Industry	March and April 1972	Counterpart of B. M. Sedalia.

in the Institute for Technological Investigations for the subject of the Colombian brick manufacturing industry through the payment of applicable living and travel expenses. The two major personnel changes that occurred in the counterpart staff during the 12-month period the project operated in Colombia are shown in Table 4.

4. Physical Support

Placeacion arranged for office space in the area occupied by the International Center for Housing of the OAS (CINVA) on the campus of the National University in Bogota. Four office spaces complete with furniture were secured, and Planeacion provided the consumable supplies and the typewriter. They also supplied the services of a full-time competent secretary (Mary de Garcia).

When it appeared in June 1972 that the project would extend through August 1972, and that the operations at CINVA were closing down, office space was provided at Planeacion's headquarters on an ad-hoc basis.

5. Results

(a) Local Expectations

The results are a series of specific actions. They are presented in detail in the Colombia report, and are summarized in Table 5. The actions can be classified in three categories, namely: those where actions have already been taken toward implementation; those where actions await decisions to implement; and those where actions should be deferred for specific reasons. Fourteen specific results in these three categories were obtained, all of which have implications for reductions in the costs of public construction. Also, all of them as a group have implications for changes, not only in the patterns of use of materials, but also in the practices represented by the construction technology

TABLE 5
THE COLOMBIAN RESULTS

<u>Action</u>	<u>Description</u>	<u>Objective</u>	<u>Action</u>	<u>Description</u>	<u>Objective</u>
<u>Actions Already Implemented</u>					
1. Establish a national inventory of heavy construction equipment.	Develop full knowledge of equipment, characteristics, location, and availability through a data processing system incorporating each item of heavy construction machinery in the country.	Reduction in cost through better utilization of heavy construction equipment.	7. Improve manufacturing efficiency of the burned-clay products industry.	Arrange to implement technological findings of the work of the Institute for Technological Investigations.	Reduce wall costs in building by encouraging competitiveness of brick and tile with cement block.
2. Develop a nonportland masonry cement.	Use available blast furnace slag as the base for a formulation, test its performance, and undertake market penetration activities.	Reduce costs of masonry work by making available a lower cost satisfactory binder.	8. Create institutional structure for promoting efficiency in housing construction.	Investigate the five areas in housing construction where the existence of problems leading to inefficiencies are suspected.	Reduce construction costs by defining problem areas and finding solutions.
3. Use appropriate labor-intensive construction methods.	Undertake a quantitative analysis of labor intensiveness in the "pick and shovel" road building program to identify areas for improvement based on the World Bank capital/labor model.	Generate employment opportunities in construction appropriate to national goals; and in the long-term build a tool for assessing quantitative effects of major changes in the materials, construction technology, and institutional practices in construction.	<u>Actions Whose Implementation Should Be Postponed for The Reason That</u>		
4. Check the accuracy of quantity surveys in road and highway construction contracts.	Undertake a review of the accuracy of quantity surveys presently estimated in a sample of recent construction contracts based on the MIT/World Bank Highway Cost Model.	Reduce costs through more accurate quantity surveys in the negotiation stage for given road alignments, and later reduce quantity surveys through identifying the optimum alignment.	<u>(a) Stepwise Progress Is Required</u>		
			9. Revision of standards and specifications.	Adopt those whose labor/capital intensiveness ratios are appropriate to national goals.	Reduction of costs in the broad sense of social costs.
			10. Appropriate maintenance policies.	Adopt those whose first cost and eventual costs reflect the country's current financial position.	Reduction of costs through knowledgeable application of value engineering principles.
			11. Revised contract procedures.	Increase accuracy of data on which contracts are based.	Reduction of costs through more effective project management.
			<u>(b) Prior Actions Should First Be Completed</u>		
			12. Importation of cement	Demand forecast and domestic supply position must first show this is necessary.	Avoid shortages.
			13. Construction of new cement manufacturing capacity.	Same reason as above.	Begin construction as soon as forecast of demand warrants.
			14. Establishment of a Service Center for Building Construction.	Problem-solving institution.	Potential cost reductions.
<u>Actions Requiring Decision before Implementation</u>					
5. Unit-train/shuttle transport of cement.	Reduce distribution costs for cement by undertaking two pilot transport schemes; one based on bulk cement and the other on clinker.	Reduce the cost of cement by converting the country's demand/supply pattern from a regional to a national one.			
6. Cement-demand Monitoring Scheme.	Collect data on an on-line basis; and formulate and test a forecasting model.	Assure adequate supplies of cement to support the construction program resulting from the implementation of the national development plan.			

employed, in the operations of institutions involved in the construction sector, and in the manufacture of construction materials.

On 14 September 1972, the counterparts conducted an oral presentation of the results shown in Table 5 to the Chief of the National Planning Department. At the same time, they submitted the Spanish version of the Summary Section (Section I) of the Colombia report to him. Currently, the counterparts are preparing the complete Spanish version of the Colombia report, which is to be the official report for the project. The current expectations are that the Chief of the National Planning Department will take the results of the work to the Council for Economic and Social Development, from which should come the decisions necessary for complete implementation of the actions.

(b) Contract Expectations

Three major changes occurred during the project activities in Colombia because of initiative on the part of the host country. These changes significantly affected the development of methodology.

● Extension of Time

On 10 April 1972, the National Planning Department in writing requested that the performance time for the project be extended from mid-June through the end of August 1972. This request for extension was granted, and actually the project field work was completed on 15 September 1972.

● Home Office Activities

Originally, the period of 3 April through 1 May 1972 was to be devoted to activities in the ADL home office, during which the papers for the eventual conference and the action planned for presentation at the conference were to be prepared and reviewed. In early April 1972, the National Planning Depart-

ment suggested that this aspect of the methodology be abandoned for practical reasons. The first, although they did not state this officially, was the administrative difficulty of financing visits overseas for the counterparts. The procedure required a decree of the president of the country, the concurrence of several ministers, and publication in the newspapers. Even if this procedure were practical to follow, the Planning Department felt that it would be unwise to lose the services of the counterparts and interrupt the continuity of the work for the period they would be away from their headquarters. They stated this last reason officially.

Nevertheless, since the nature of the work required a certain amount of overseas field work, visits to the United States were sponsored under the ADL contract for two of the counterparts for specific, narrowly-defined purposes. One purpose involved the cement investigation and the other the modeling work in road and highway construction currently in progress in the World Bank offices.

- Conference

A dilemma arose with respect to holding a conference as the final step of the project activities, in order to assure that the actions recommended were practical to implement. Some of the results of the work were sensitive as far as giving them publicity in a conference was concerned, and accordingly these should first be approved at policy-making levels of the National Planning Department and the Colombian Government. To secure such approval, the full report of the project would have to be submitted beforehand, and moreover it could take considerable time for the necessary approvals to be obtained. Therefore, the counterparts took the decision to make the conference concept the first step in any action that is recommended, rather than the last step of the project itself.

Another change with respect to the conference was the recognition that the subject matter was so broad in scope that a single conference might not be manageable and would require a large attendance of people who would have little interest in other than one or two topics. The decision, accordingly, was taken to recommend a single, narrowly-defined conference for each topic that warranted it.

B. THE PHILIPPINES

At the present moment, work on the Philippines phase of the project has not yet begun. The reconnaissance visit was made during the period 26 June through 15 July 1972. During this visit, decisions were taken by the Philippine Government to seat the project in the Bureau of Public Highways of the Department of Public Works and Communications, to appoint a steering committee for the project whose chairman would be the Secretary of the Department of Public Works and Communications, to select the Chief Highway Engineer of the Bureau of Public Highways as the counterpart to the ADL project manager, and to devote a continuous 4-month period to the field work. A tentative project statement was written which was reviewed in an oral presentation and approved by the Steering Committee. At the present time, the intention is to begin work in November 1972 and complete it during mid-March 1973.

The significant difference to be expected in the methodology for the operation of the project in the Philippines as compared with that in Colombia is based on the nature of the host organization for the project. The National Planning Department in Colombia has broad interests in all phases of planning which encompass public construction activities. As the result, the topics selected were diverse and this required attention to a broad scope of activities and a penetration of depth in each topic that was dependent on the budget restrictions and the time avail-

able. In the Philippines, the scope of interest will be narrower, and the expectations are that the penetration of detail in depth can be considerably greater than it was in Colombia.

IV. EVOLUTION OF A METHODOLOGY

The experiences in Colombia so far, as these are identified and detailed in the Colombia report, enable a beginning to be made toward the identification of the methodology that ultimately will be specified for achieving cost reductions in public construction. At this writing observations of the type presented below still remain to be formulated from the results of work to be undertaken in the second country (the Philippines), and in an as yet unidentified third country.

A. RESPONSIVENESS TO GOALS

The goals as outlined above (in Section I) exist at two levels: one in which the expectations in each country are to be addressed; and the other in which the expectations of the contract for the development of methodology are to be addressed.

1. Local Expectations

The AID/ADL contract terms specify the local expectations in terms of their professional content, which is a focus primarily on the use of materials and secondarily on the institutional framework in which cost opportunities in materials adaptation can be achieved. The professional content may be rephrased as follows:

- Appropriate cost-saving materials adaptation projects will be identified, and the services of better-trained local engineers to manage the activities involved will become available. In this respect appropriateness is defined as including emphasis on prospective maximum cost-reducing effects, on the use of indigenous materials, and on improving balance of payments.

- The opportunities thus identified will be achieved by assisting organizations in developing countries concerned with civil engineering projects financed by local government agencies, by encouraging acceptance by them of cost reduction and value engineering concepts, and by analyzing institutional and social barriers to the use of improved materials;
- the foregoing will be accomplished within the administrative structure set up for the project.

The major result from the Colombia phase is that the project work has fully met local expectations, but not entirely in the manner foreseen in the contract specification. The evidence that local expectations have been met is oral in nature and has developed in a series of official and unofficial meetings in Bogota during the week of 11 September 1972. The elements of this responsiveness are the following:

Materials Adaptation Projects. An opportunity for cost reduction based on use of an indigenous material was identified, and specific recommendations were made in order to achieve cost reductions. The opportunity is the use of the blast-furnace slag now being produced and wasted at Colombia's only integrated iron and steel works at Belencito (Boyaca Department). Except for minor local uses as a fill material, the slag is wasted in a dump, which already contains by estimate about 10,000,000 tons of material now totally useless. Blast-furnace slag has potential as a cementmaking raw material, and the quantity now produced is substantial at about 900 tons per day.

Action 2 (Table 5) describes the recommendation to develop a non-portland masonry cement that could reduce the cost of masonry wall construction. The research and development work involved would be

done by either or both of two local research development groups under contract with the appropriate government agency in Colombia. These groups are the Construction Institute of the University of Valle at Cali and the Institute for Technological Investigations in Bogota. At the present writing, the former is preparing a formal proposal, while the latter has expressed their interest.

Although not contained in the Colombia report, the activity in the field included encouraging the already expressed interest of a major cement manufacturer (Cementos Boyaca) to use slag in conventional portland cement manufacture as the means of reducing the need for new clinker and the associated capital-intensive investment. Also, there is a possibility for producing slag-cement formulations, suitable for foundation work. However, the cost reduction implications here are not obvious, since no doubt savings would be submerged in the commercial operations of the cement firm.

Scope of Work. The Colombian experience showed that responsiveness to local goals may have to be measured with a scope broader than emphasis only on materials adaptation. The results show that opportunities for cost reduction could be lost if activities were limited only to materials and their utilization. The extent to which the scope should be broadened depends probably on the scope of interest in the counterpart organization. In Colombia, the interest lay also in the technology employed in construction and in increasing the effectiveness in the institutions involved in the construction sector.

Definition of Cost. A broadening of the scope also occurred during the project activities as a result of the definition adopted of "cost". A broad definition was agreed upon (see Page 6 of Appendix A, and also Page 15, of Colombia report) in which the implication of a specific

reduction in construction cost on the generation of opportunities for labor employment and the effect of the cost reduction on balance of payments are incorporated.

Project Completion. Although the overall responsiveness to the expectations of Planeacion to the project seems to be total, the counterparts do not feel that the Ad-Hoc stage of the project is now complete. Rather further activity is required on the same basis; but before this proceeds, the counterpart organization must delineate its priorities from all of the potential cost reduction opportunities identified in the work so far. Further efforts would then be planned by matching resources to the priorities. Related to this need, the counterparts should now be in the final stages of preparing the formal version of the Colombia report in Spanish for presentation for decisions on the recommendations.

Summary. Table 6 summarizes the responsiveness of the project results to the broadened scope of the activities. Further inputs to the results of the work in Colombia should become evident about July 1973, at which time a follow-up visit is planned to Bogota to ascertain the actions actually taken on the results of the work on the project and the progress achieved by then. Also at the time of follow-up, an attempt will be made to ascertain reasons should there have been no action with respect to any of the findings of the work in Colombia.

2. Contract Expectations

The methodology postulated before beginning the work in the first country (Colombia) has already been stated above (Section I). The Colombian experiences show that changes in this methodology have become

TABLE 6
RESPONSIVENESS TO BROADENED WORK SCOPE

<u>Action Numbers in Table 5</u>	<u>Title</u>	<u>Responsive to Change in</u>
1	Heavy Construction Equipment Inventory	Institutional practices to reduce future imports of equipment.
2	Develop A Nonportland Masonry Cement.	The adaptation of materials.
3	Labor Intensive Methods.	Technology appropriate to generating new labor employment.
4	Quantity-Survey Accuracy.	Institutional practices to help avoid shortage of finance.
5	Unit-Train Shuttle Cement Transport.	Technology appropriate to reducing transport costs.
6	Cement-Demand Monitoring.	Institutional practices to avoid shortages in supply.
7	Burned-Clay Products.	Technology to increase efficiency in manufacturing.
8	Institutional Structure in Building Construction.	Institutional structure to enable problems impending cost reduction to be identified and solved.
9	Revision of Standard And Specifications.	Technology appropriate to employment generation and to improvement in balance of payments.
10	Maintenance Policy	Technology appropriate to the consideration of value engineering.
11	Revision to Contract Procedures.	Institutional structure in road and highway construction.
12	Importation of Cement	Institutional structure affecting balance of payments.
13	New Domestic Cement Manufacturing Capacity.	Technology appropriate to reducing manufacturing cost of cement.
14	Building Construction Service Center.	Technology and materials appropriate to housing construction.

necessary for specific reasons. Some of these reasons arose from the nature of the counterpart organization, while others arose from the nature of the technical efforts themselves. Revisions should be incorporated in certain steps of the methodology as follows:

Analysis And Conference Planning. The intent of the work here was to enable the project to be finished in the particular country by conducting a conference as the means for testing action plans for practicality of implementation. It developed that certain topics involved in the project work were considered by the counterpart organization in Colombia (Planeacion) to be sensitive to publicity. This made it impractical to divulge the results of the work at a conference, which would of course be a public affair, until the management of Planeacion has had the opportunity to consider the results and decide on their acceptance for implementation. Such an acceptance would have to come from the highest council in the executive branch of the government, the Council for Economic and Social Development; but, action by that group was not possible until the project report had been completed. Accordingly, as far as the Colombia phase is concerned, the concept of the conference was transferred, where appropriate, as the first step in an action plan.

Project Review And Report Preparation. The methodology had foreseen work in the ADL home office, outside of the host country, where the counterparts would test and rehearse the results of the work before conducting the conference. Planeacion (letter to ADL, 6 April 1972) considered this element of the methodology to be of little benefit, but even more important that the interruption in the work entailed by an overseas mission by the counterparts would be prejudicial to the progress of the work. They suggested that the advice that would be available in ADL's headquarters could be obtained by mail. Not stated in this letter was the fact already noted above that the Colombian Government administrative procedures for overseas travel were cumbersome. Instead, we developed

an alternative in which ADL sponsored overseas trips for key counterpart personnel in the subject areas that could be clearly defined. As already noted, this procedure was followed for two of the counterparts.

Conference Activity. Two changes were made in this respect. The first was to shift the conducting of a conference to the first stage of implementation, when the topic required this. The second stage involved recommending a number of separate conferences of narrowly defined scope in order to make the number of participants manageable and to avoid inefficiency because of lack of interest of participants in all the subjects in a single conference. Accordingly, conferences were specified in the Colombia report for the following topics:

- Bulk Cement Transport by Unit Train, Recommendations.
Page 11, Items 4 and 5, Colombia report.
- Cement Demand Monitoring Group, Item 6, Page 12.
- IIT/UNIDO Recommendations in The Burned-Clay Products Industry.
Item 7, Page 12.
- Forum for The Building Construction Sector, Item 8, Page 13.

With respect to the first and second steps, Detailed Project Planning and Reconnaissance, the Colombian experience indicates that changes may be warranted as far as work in the second and third countries is concerned. The work in detailed project planning requires the conducting of a literature search and consultation with knowledgeable people. It probably will be more productive to defer the literature search until the completion of the work in the third country, at which time it should be carried out and completed but confined to the sum total of the topics covered in the three countries. If work is subsequently undertaken in other countries, the scope of the literature

search could be broadened and brought up to date accordingly. The experience so far is that little or no use has been made of the results of the literature search conducted in July and August 1971.

On the other hand, consultation with knowledgeable people whenever the opportunity arises should be a continuous effort during the course of the work in all three countries. The remaining activity in detailed project planning, the identification of organizations in the host country, should be combined with the work in the reconnaissance step.

The objective of the work in the reconnaissance step should be to achieve a written tentative project statement before this stage is completed. This result has already been achieved with respect to the second country, the Philippines. If a project statement should be found not feasible to prepare, then probably the country involved may not be ready for the project.

B. AREAS FOR ATTENTION

So far, the Project results apply only to the first country of three, Colombia. They show that there has been practically total responsiveness to the local expectations, and that there has been significant deviation from the methodology and scope postulated beforehand in order to satisfy the local expectations. Although with respect to methodology it has not been practical to incorporate the concept of a conference in establishing recommended cost-reduction actions as far as Colombia is concerned, this need not rule out the prospect that this concept can be incorporated in the work in the countries to come.

On the other hand, the focus of the technical content of the work has broadened away from concentration on materials and materials technology as the primary means for generating and achieving opportunities to

reduce costs in public construction, and this focus has included construction technology and institutional practices. The broadened focus has carried forward into the projected work in the Philippines. It will be interesting to note whether this broadening is a trend which will carry forward also into the work of the third country.

Finally, at this stage of completion of the project, experiences in only one country should not be allowed to influence flexibility in selecting the methodology for completing future work in the Philippines and in the third country. Accordingly, the areas for attention remain as discussed below.

1. Nature of Host Organization

So far, the organization in the host government in which the project is located seems to influence the breadth of scope of the work. In Colombia, the project was located in the broadly oriented National Planning Department; whereas in the Philippines, the project will be located in the more narrowly oriented Bureau of Public Highways, which is part of the Department of Public Works and Communications. In Colombia, the scope of the work accordingly has been considerably broader than was envisaged when the methodology was planned. In the Philippines, the scope is quite narrow and confined entirely to the construction of public roads and highways, but still extends beyond a materials adaptation focus.

In both cases, the scope conforms to national goals. In Colombia, the topics are responsive to the goals of the National Development Plan which was published in January 1972, and accordingly, the scope emphasizes as a major topic the construction of urban housing, and the availability of the major building materials required to support the program on the scale envisaged. Furthermore, the work on roads and highways was planned to be

a support ultimately for the urban development to occur as part of expansion of urban housing construction, although we found some vigorous disagreement within Planeacion whether this need be so. In the Philippines, the current national development plan focuses on road and highway construction because this is the area where there will be the major expenditure of the country's resources during the next few years.

2. Selection of Topics

The experiences in Colombia and in the Philippines so far confirm Bell's statement noted above that changes in methods of operation in many developing countries will be influenced by a continuing steady increase in nationalistic attitudes and policies. These attitudes and policies have been defined for us so far through the existence of national development plans. The Colombian plan is a qualitative one in that it does not list projects and expenditures to be made on them. Rather, it discusses priorities and the strategies for achieving the goals set by the priorities. The Philippines plan is quantitative and quite specific. Projects are listed in detail, and cost estimates are presented. The difference in the two plans can explain in large part the speed at which it was possible to identify a project statement in the Philippines, compared to the length of time this required in Colombia. However, the fact that the Colombian experience had already been gained before the Philippine activity may be another explanation of the greater speed in the Philippines.

The sensitivity of topics to publicity is another factor in the choice of topics for attention in the project work. The important factor here concerns materials of construction and their manufacture. Both Colombia and the Philippines have private enterprise oriented economies, and actions developed that can affect the position of industry involved in the manufacture of materials of construction may need to be kept quite confidential until the appropriate time.

For example, in Colombia the major material of construction involved in the project work was cement manufacture. The goals of the work on cement were to assure adequate supplies of cement at all times to support the anticipated building program and to provide the supplies at prices that represent the minimum levels consistent with modern technology and an acceptable profit level for the industry. Opinions existed within Planeacion that the cement manufacturing industry had an oligarchal ownership, which managed to maintain cement prices at high levels within the country while exporting in some cases at world price levels. The belief existed too that pressures for price rises under Government price regulation were many times unwarranted.

3. Execution of The Work Plan

The work plan in each country will be executed by the counterpart personnel and their level of education, experience, and sophistication is significant for effective accomplishment. Bell has pointed out the change toward higher levels in these respects in developing countries.

The level in Colombia was high. Two of the personnel listed in Table 4 were MIT graduates, one with an advanced degree. One had an advanced degree from Stanford University; one from University of Michigan; and two other degrees from overseas universities, one in Scotland and the other in Holland. The project secretary had been at one time the secretary to a former mayor of the City of Bogota. The age levels were generally under 30. For the Philippines, except for the project head who is the Chief Engineer in the Bureau of Public Highways, the counterpart staff has not yet been identified.

Administrative obstacles may exist that affect the method of accomplishing the work plan. The problem of securing expenses for overseas travel for personnel in Colombia has already been mentioned. On

the other hand, no problem existed with respect to internal travel within the country in Colombia. The other administrative obstacle that is significant involves the need for secrecy and internal approvals before results can be made public. This need can affect the choice of the final action for completing the work in the country, i.e., whether or not a public conference is practical.

Language differences existed in the first country, Colombia; but will not exist in the second country, the Philippines. On the other hand, in Colombia all counterparts were fluent in English. In fact, one counterpart stated that he felt more comfortable working in English than in Spanish. Investigations within the country, however, will occur in the local language, but this should not be a problem if the investigations are conducted by the counterpart personnel. Language differences require the production of reports in both languages in order to satisfy the needs of the contract. An ideal approach to report writing seems to be discussion between two persons each expert in one of the two languages, agreement on the precise thought to be recorded in the report, and recording the thought in the two languages simultaneously. The Project Statement in Colombia was produced this way. The Colombia report, however, was not because none of the counterparts has a breadth of viewpoint that encompassed all the topics.

4. Participation

The project statement in Colombia (Section 5.0, page 22, Appendix A of the Colombia Report) envisaged broad participation by 21 different organizations (Table 5.1). In practice, only two organizations (the National Planning Department and ADL) participated in the work with major assistance from the Ministry of Public Works. However, a number of the remaining organizations in the list cooperated through the furnishing of

information whenever approached. It seems that in order to secure specific participation by other organizations, specific tasks need to be defined, and commitments negotiated to undertake them. In Colombia, the participation of Londoño y Velasquez was obtained by formal subcontract from Planeacion for their services. UNIDO/IIT help was obtained informally.

More intensive concentration at the beginning of the work in securing maximum participation seems warranted.

5. Implementation

The project seeks the achievement of results, in addition to the identification of opportunities. Implementation of recommendations is accordingly required, and this can be impeded by a number of factors which require attention during the course of the work.

Vested Interests. Vested interest can exist anywhere, and they can be affected by the implementation of cost-reduction opportunities. At the same time, the cooperation of these interests is required in the course of the work in order to provide data and information for identifying cost-reduction opportunities. The results in Colombia in this respect is that considerable effort was required to accumulate meaningful data, and that the time available to accomplish the project limited the amount of information that could be compiled. Accordingly limited results were obtained in this respect. Appendix B in the Colombia report discussed the details and offers a potential solution to this problem.

Cultural Environment. The important factor in the cultural environment for the project is the set of ethics by which people conduct their daily activities. The ethical yardstick for the project is based on western practices, especially with respect to the binding nature of commitments, whether as formal contracts or otherwise. Ethical practices in other countries (the Philippines is a good example) need not agree

with such a yardstick. The expectations are that local ethical standards in the Philippines differ considerably from the western yardstick, to the extent that plans involve services of a consultant anthropologist sensitive to the cultural differences.

Another difference in cultural environment is commitment to schedules. In Colombia, procrastination or "mañana" has been considered to be a significant difference with the western yardstick, although this was not noticed during the course of the work as far as the counterparts were concerned. In fact, at times the reverse was true in that some counterparts pushed for completion ahead of what had been considered in the planning.

High-Level Interest. Interest in the project at a level high enough to take meaningful policy decisions is important, if results are to be implemented. In Colombia, the initial interest occurred at the level of the Chief of Planeacion, who is a member of the President's Council of Economic and Social Development. Once the administrative details for the work were settled, the interest sank quickly to the lower levels where the work was being accomplished. There was no opportunity to report regarding the progress of the work and to ask questions of guidance until the work was completed, when it was possible to arrange for an oral presentation to the Chief of Planeacion. It is not clear at this time, how Planeacion will manage the presentation of the project findings to the Council of Economic and Social Development.

In the Philippines, the opposite situation seems to be true. A steering committee has already been set up by official order of the Secretary of the Department of Public Works and Communications, who is to be the Chairman. The remaining membership consists of the head of

Philippine Contractor's Association, the Dean of Engineering in the University of the Philippines, the Director of Public Works in the Department, and the Commissioner of Public Highways in the Department. It seems now that progress reports can be made and guidance questions asked at appropriate times during the course of the work in the Philippines.

Incentives. Incentives involving government policy decisions may be required in order to implement actions, particularly where the manufacture of materials of construction is involved and the manufacturing industry is in the private sector. One situation in this respect has occurred so far in Colombia, and it involves the cement manufacturing industry. The government believes that an expansion of productive capacity is required, but at the same time the timing of this expansion, the quantities of new cement production required, and the details of new plant construction are not clear. The industry may not choose to expand in a way that suits an objective of providing adequate cement supplies at the proper time and at minimum price. The Colombian Government has at its disposal many alternatives for establishing incentives, but the results of the project work should provide the basis upon which alternative incentives can be identified and evaluated.

C. CANDIDATE TECHNIQUES

The experiences so far in Colombia and the results of the reconnaissance in the Philippines indicate that the techniques described below are appropriate for use in the evolution of a final methodology which is expected to be the result of the project work in the three countries.

1. Project Statement

The publication and public distribution of a project statement should be the first task of the work in any country. As the top-level

counterpart is identified, he and the project manager representing the AID contractor as their first joint task should establish the statement. Once their final draft had been established, the approval of the contents should be obtained either from the top-level person in the government organization in which the project is located, or from the steering committee for the project, if one exists.

The distribution of the project statement should be aimed at obtaining the cooperation of organizations who can actively participate in the work by undertaking specifically and narrowly defined topics for investigation. The distribution should also be aimed at organizations, who can help by providing data and information.

The statement should include the purpose and the scope of the project in some detail and an outline of the method in which the objectives ought to be achieved. The method of achievement should involve sufficient depth of investigation so that it is clear that an action for implementation can be identified and justified, whose results will be meaningful in the reduction of construction costs. The idea of conducting one or more conferences should be retained in order to test the practicality of the action identified, unless it is clear at the outset that the sensitivity of the topics will not permit such a step.

In Colombia, it required forty-nine calendar days duration to reach the publication of the project statement. In the Philippines, the time requirement was nineteen calendar days. Aside from the fact that the Philippines represent a second effort in this direction and had the benefit of the Colombian experience, the longer time is explained by the fact that the National Development Plan was published in the middle of the period during which the project statement was prepared.

The activities before the publication were diffuse and involved administrative argumentation across the organization lines of host country agency in which the project was located (Planeacion). Once the development plan was published, work proceeded more directly to the completion of the project statement.

2. Stimulation of Efforts.

The nature of the stimulation function performed in Colombia seems to be explainable by a number of factors as follows:

- The presence of ADL required that counterparts continue to perform so that their organization would not be embarrassed. This prevented other day-to-day activities not related to the project from interfering materially in the progress of the work.
- The original five topics defined in the project statement for Colombia (Table 3) cut across the organizational lines of three major divisions of Planeacion. The Planeacion organization provides little or no encouragement for cross-communication at the levels of the counterparts. The ADL presence was a means of promoting such cross-communication; in other words, ADL performed a coordination among the three divisions of Planeacion which would have been difficult for Planeacion to perform themselves.
- Again, to avoid embarrassment, the presence of ADL assured the commitment by Planeacion to the completion schedule agreed to for the project.

ADL presence was not continuous and occurred at four different periods during the execution of the work, as shown in Figure 1. The plan for the Philippines is for the continuous presence over a four-month period. The choice between continuous and intermittent presence seems to be a function of the nature of the counterparts in terms of their technical sophistication, education levels, and personal motivation with respect

to the project. Selection of intermittent presence in Colombia seems to have been the proper one, because momentum was not seriously reduced during the periods of absence.

3. High-Level Interest

Maintaining a continual interest at high levels of government, at which it is possible to make policy decisions, is probably vital to achieving cost reduction results, although not necessarily to identifying opportunities for such results. Since achievement is the ultimate goal of the project work, high level interest should be identified and maintained. In Colombia such interest was obtained at the end of the project work, while in the Philippines such interest is available at the beginning of the work. To maintain continuing interest, presentation of findings at intermediate stages of the work should be made to the steering committee already identified in the Philippines. An oral presentation for approval of the project statement has already been made to the steering committee on 14 July 1972.

4. Technical Approach

The discussion in Appendix B of the Colombia report represents in principle perhaps the most significant technical findings so far in the work. This discussion points out the differences in approach in which the investigation is "piece-meal" as opposed to an investigation which is "integrated."

The piece-meal approach tends to collect and compile relevant data through the combination of intuition and knowledge of the country to select and pinpoint areas for investigation that assure the highest

probability of success in identifying cost reduction opportunities. The approach also encounters the resistance which should be expected from elements in the construction sector whose interest could be threatened by the findings, but whose cooperation is necessary in order to provide proper and accurate data.

In the integrated approach, an analytical tool would be developed capable of providing needed quantitative information quickly, such as answers that are the cost implications of a wide selection of fundamental materials, technology, and institutional changes that can be considered in the construction sector. It becomes practical then to illustrate and document the costs of alternatives for change and to put the burden of proof that such costs are realistic on the construction sector itself. The piece-meal approach puts the burden of proof on the investigator. The caution to this potential is that the integrated approach can provide results only in the longer term because the analytical tools are still in an early stage of development and application.

The two components of the analytical tool are the highway cost model which is now available for application and is finally completed by the Massachusetts Institute of Technology for the U.S. Department of Transportation, based on work begun and still active by the World Bank; and on the capital labor model also developed by the World Bank as a tool for finding the appropriate use of labor in the technology of constructing roads and highways in developing countries. The discussion in Appendix B of the Colombia report (Sections 2 and 3) outline how these two models can be "integrated" to produce the needed analytical tool. The action plan for the road and highway sector (Section III of the Colombia report) describes how the integrated models can be adopted in a stepwise procedure for use in Colombia. A similar approach is anticipated in the topic "Labor-Utilization Policy for Programming New Highway Construction" adopted for the Philippine work in the tentative project statement (see letter, ADL to Chief Highway Engineer, 14 July 1972).

Considerable preparation work should be undertaken in advance of the Philippine work to obtain detailed information from the proponents of the two mathematical models.

5. Participation

The plan for ADL participation in the project is for continuous presence over a four-month period. The expectations are that continuous presence will be necessary in contrast to the situation in Colombia. This expectation is being tested. Beginning work on the basis of the tentative project statement before the ADL arrival was recommended on 15 July 1972. The amount accomplished will be checked on arrival. If little will have been accomplished to respond to this recommendation, the current political situation in the country and, the serious rains in July/August 1972 might account for it.

Potential participants in the Philippine project have not yet been identified in the tentative project statement. A review of the results for the integrated approach above for Colombia might lead to some definitive participation in the project by a representative of the World Bank, either as a new effort, or perhaps through enlisting the cooperation of their current contractor in the Bureau of Public Highways, KAMPSAX-Berger. A particular effort should be made immediately on beginning the field work to identify specific narrowly defined jobs that potential participants could undertake and complete.

Selection of local and foreign consultants may be appropriate. For the Philippines, it will be useful to secure the services of a knowledgeable anthropologist sensitive to the difference between Philippine and western culture. This need is recognized even by the chairman of the

steering committee for the project. It appears useful to secure the services of an experienced practical road and highway construction manager who has worked in developing countries under conditions comparable to those which prevail in the Philippines. The focus of the efforts of such a consultant will be on the two projects involving improving the pattern of use of heavy construction equipment and on the data collection aspects for implementing a labor-utilization policy in programming new highway construction.