UNCLASSIFIED

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D. C. 20523

GRENADA

PROJECT PAPER

POINT SALINES AIRPORT

AID/LAC/P-176

Project Number: 543-0006
543-0010

UNCLASSIFIED

PDAP P 244

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: A (A = Add, C = Change, D = Delete) — Amendment Number: _____ — DOCUMENT CODE: 3

2. COUNTRY/ENTITY: Grenada

3. PROJECT NUMBER: 543-0006

4. BUREAU/OFFICE: LAC 05

5. PROJECT TITLE (maximum 40 characters): Point Salines Airport

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 12 DD 31 YY 85

7. ESTIMATED DATE OF OBLIGATION (Under "B." below, enter 1, 2, 3, or 4): A. Initial FY 84 B. Quarter 3 C. Final FY 86

8. COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. Total	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. Total
AID Appropriated Total	19,000		19,000	19,000		19,000
(Grant)	(19,000)	( )	(19,000)	(19,000)	( )	(19,000)
(Loan)	( )	( )	( )	( )	( )	( )
Other U.S. 1.						
Other U.S. 2.						
Host Country		2,500			2,500	2,500
Other Donor(s)						
TOTALS	5,300			5,300		5,300

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	C. PRIMARY TECH. CODE 2. Loan	D. OBLIGATIONS TO DATE 1. Grant	D. OBLIGATIONS TO DATE 2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	E. AMOUNT APPROVED THIS ACTION 2. Loan	F. LIFE OF PROJECT 1. Grant	F. LIFE OF PROJECT 2. Loan
(1)	B	820				19,000		19,000	
(2)									
(3)									
(4)									
TOTALS									

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)

11. SECONDARY PURPOSE CODE

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code							
B. Amount							

13. PROJECT PURPOSE (maximum 480 characters)

The purpose of this project is to make the Point Salines Airport in Grenada operational with VFR standards for the use of large jet aircraft, landing day or night, by October, 1984. Full completion of the airport is scheduled for December 31, 1985.

14. SCHEDULED EVALUATIONS: Interim MM 10 YY 84 — Final MM 10 YY 87

15. SOURCE/ORIGIN OF GOODS AND SERVICES: ☐ 000 ☐ 941 ☐ Local ☐ Other (Specify) _____

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment.)

17. APPROVED BY — Signature: Mr. Dwight B. Johnson — Title: Director, LAC/DR — Date Signed: MM DD YY

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

AID 1330-4 (8-79)

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON D C 20523

PROJECT AUTHORIZATION

Name of Country: Grenada

Name of Project: Point Salines Airport

Number of Project: 543-0006/543-0010

1. Pursuant to Section 531 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Point Salines Airport for Grenada involving planned obligations of not to exceed Nineteen Million Dollars ($19,000,000) for completion of the Point Salines Airport in Grenada, and Two Million One Hundred Thousand Dollars ($2,100,000) for replacement of equipment provided under the Plessey and Metex Contracts plus cost and damages incurred by virtue of the work interruption under these contracts, in Grant funds over a twenty (20) month period from the date of authorization, subject to be availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the project.

2. The Project Agreement may be negotiated and executed by the officer to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority.

3. Source and Origin of Goods and Services

Goods and services, except for ocean shipping, financed by A.I.D. under the Grant shall have their source and origin in the United States or Grenada except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the grantshall be financed only on flag vessels of the United States except as A.I.D. may otherwise agree in writing.

4. Waivers

Contracting Waivers Have Already Been Obtained from the Deputy Administrator as per the attached memorandum.

Administrator

4-27-84
Date

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Chapter One

(A) Project Background and Rationale

Construction of an airport at Point Saline was proposed first in a study carried out by the London Board of Trade in 1968. Subsequently, the U.K.'s Ministry of Overseas Development carried out an economic and technical feasibility study of the airport in 1969. The project was divided into three parts: (i) Design of the Master Plan, overall direction and policy determinations for the development of the airport were the responsibility of the Cuban Ministry of Transport (MITRANS). Construction of the airport was performed by a Cuban parastatal organization identified as UNECA. Construction work, financed by the Government of Cuba, began in late 1979.

In addition to construction agreements with the Government of Cuba, the Government of Grenada entered into two additional contracts:

(ii) A contract was let with a British firm, Plessey Airports, Ltd., in May 1982, for procurement and installation of electrical and electronic equipment as well as the supply of normal airport operating equipment. The Plessey contract, including an allowance for training, comprised 1,622,784 Pounds Sterling for management services and 4,877,216 Pounds Sterling for installed equipment, a total of 6,500,000 Pounds Sterling, or approximately $9,100,000 (U.S.).

(iii) In addition, a contract was let with METEX, a Finnish firm, for airport lighting and fire fighting equipment as well as training on the equipment supplied. The METEX contract was in the order of $2.4 million (U.S.).

Much of the Plessey and METEX-furnished equipment was stored in a building known as the "Plessey Warehouse," and during the rescue mission some of it was vandalized. Prior to the rescue mission, Plessey was in the process of renegotiating their contract and had submitted a change order estimated at $2.5 million. In addition, as a result of the rescue mission, Plessey has claims estimated at $1.6 million. METEX has estimated it will require an additional $500,000 to repair or replace equipment damaged during the rescue mission. The Government of Grenada has recently signed an amendment to the Plessy contract accomodating the requirements of the change order. Under project No. 543-0010 A.I.D. will pay appropriate Plessey and METEX claims after these are identified by the Army claims service.

The Cuban Government provided heavy earthwork equipment as well as a rock crushing plant, an asphalt mixing plant and an asphalt paving machine to the Government of Grenada in order to complete the airport. At this time, an equipment specialist is in Grenada to determine the condition of this equipment, some of which may be operable. Further, we understand that the Government of Cuba has requested the Government of Grenada to return this equipment, and the Government of Grenada has

determined that the equipment is owned by the GOG and will be available for use on the airport project.

In late 1983, following the rescue mission, A.I.D. engaged the services of Wilbur Smith and Associates, Inc., to conduct a prefeasibility study of the cost and benefits to be derived from completion of the Point Salines Airport. The contract included a request for an evaluation of the original Cuban Airport design and authorized the contractor to propose modifications in line with likely traffic projections and economy of operation. The Wilbur Smith, Inc., experts completed their work at the end of January 1984 and concluded inter alia: (1) The cost to complete Point Saline Airport to a standard that would meet ICAO and international carrier recommended practices is in the order of $24 million. This investment would make operable a facility with total development costs in excess of $76 million. (2) Additional tourist benefits from long range jet/day/night operations are such that expedited completion of the airport is recommended. (3) The present LIAT operations at Pearls Airport should be moved to Point Saline when the airport is placed into operation. (4) The incomplete Terminal Building is over-designed, and the building should be modified. (6) Both the Plessey and METEX contracts should be renegotiated and continued. (7) The planned size of the fuel farm should be reduced and arrangements made for its operation by a private company as a concession. (8) A land use study of the airport environs should be commissioned.

With the conclusions of the Wilbur Smith report in mind, a special sub group meeting was called by the chairman of Grenada's Interim Government at the Sixth Caribbean Group sessions at the World Bank, February, 1984. In his presentation, the leader of the Grenada delegation observed ". . . in its program for economic development, the previous administration placed great emphasis on the expansion of the tourist industry and, to that end, allocated considerable resources to the construction of the Point Saline Airport. This airport was expected to be the catalyst in the expansion of the tourist and ancillary industries and in reducing unemployment, and I must stress that, economic benefits aside, the Point Saline Airport has now been incorporated into the national psyche of Grenada. To obtain it, the people were psychologically prepared to endure higher taxes, and a considerable deterioration of the roads and telephone and electricity services." In short, Mr. Brathwaite, the leader of the Grenada delegation and Chairman of the Interim Government, was noting that the leadership (public and private sectors) as well as the Grenadian people themselves feel that the future of the island lies in increased commerce, especially tourism. And the future investment in commerce and tourism depends on the ability to reduce the cost of and increase foreign market accessibility, the first step of which is to land large commercial jet traffic (day and night) on same day service from overseas to the airport at Point Saline.

In addressing this request of the Government of Grenada, the White House, in a memorandum for the Secretaries of State and Defense, noted the completion of the Point Saline Airport is essential to tne Grenadian economy. Further, that the President has directed that we promptly determine the most expeditious means and source of funding for bringing this facility to a position where it will accommodate transoceanic aircraft as recommended by the A.I.D. chartered study.

Because the GOG wishes to take advantage of the 1984 - 1985 tourist season, as well as the political implications involved in rapid completion of the airport, it was decided to complete sufficient work so that the airport could be certified and opened for day/night operations in October, 1984. Final completion is scheduled for December, 1985.

Rationale for the airport at Point Saline rests primarily on the ability of the airport to accommodate large jet aircraft during both day and night operations on same day service from abroad. At the present time, except for short range flights within the region, it is impossible to directly reach Grenada without transiting another nation, generally Barbados, Antigua, or Trinidad. At these transit points, one must switch carriers thereby incurring additional costs as well as scheduling difficulties. Thus, Grenada has not been able to share fully in the large lucrative tourist trade enjoyed by both Barbados and Trinidad. The Point Saline Airport will remedy this situation. Further, the unusual circumstances which caused the

departure of the Cubans have left the project at a stage where some $43 million has already been invested. This investment may be viewed as "sunk costs," and the economics involved in completing the airport are supportive. Tourist projections made by the Wilbur Smith and Associates, Inc., team have been very conservative and are not based upon additional infrastructure investment other than repaving of the road running from Sugar Mill to St. Georges. Even so, completion of the Point Saline Airport is justified economically.

While at the present time there is no Country Development Strategy Statement for Grenada itself, the project does fit nicely into the Strategy Statement for Caribbean Regional Programs and fully supports the export growth and investment objectives of the Caribbean Group Initiative (CBI). In the RDO/C CDSS of 1982, it is noted that the main theme of RDO/C's program, both long and short term, is directed at "increasing employment and output in the productive sectors." The Point Saline Airport in Grenada will have a substantial effect on employment in that island's economy. In the short run, there will be the not inconsequential amount of local labor required to finish construction and subsequently to operate the airport. In the longer term, there will be the much greater effect on employment created by the increase in investment in the tourism, commercial manufacturing sectors and agriculture as well as in tourism itself. The growth in services required in such a labor-intensive industry as tourism will have an immediate beneficial impact on employment in Grenada.

Productive investment - another goal of the Caribbean Regional Program - is likely to be stimulated greatly. While the Wilbur Smith and Associates, Inc., report does not assume major investment in additional tourist accomodations - the growth in the tourist industry used by the study team is extraordinarily conservative - it was assumed that modest growth will take place as needs increase. Since the report was completed there is considerable evidence of significant new investment in tourism in Grenada: Private concerns have met with US and Grenadian officials, US airlines have reflected willingness to open new routes to Grenada and the cruise ship industry has already resumed visits to Grenada. Likewise, public sector investment in improved roads, water supply, electric generating capacity, sewer systems, etc. will have to occur as the tourist industry grows. However, should the present nature of tourism in Grenada (limited cottage-type accommodations with high individual cost) change (to high occupancy hotels with relatively low individual cost), large scale private investment will be needed to accomplish this transition. The Wilbur Smith and Associates, Inc., report does not base its positive economic findings on this premise, but the Point Saline Airport project makes this change in the nature of and profit inherent in the tourist industry a very real possibility.

Insofar as the Government of Grenada is concerned, the Point Saline Airport project is at the heart of its development plan. In its Public Sector Investment Program for 1984-86, the Government has allocated some 20 percent of the entire budget to completion of the airport.

(B) Contributions by Other Donors

In addition to the U.S. contribution of $19 million, several other donors are involved in the project. The Government of Canada has pledged $8.6 million Canadian Dollars from the CIDA Program. The U.K. has pledged 360,000 Pounds Sterling from ODA funds. The European Economic Community has pledged 1.6 million European Currency Units. And the Governments of Trinidad and Venezuela are considering an offer to supply fuels and asphalt needed during the construction phase.

In fact, the airport has such a significant impact on Grenada's entire economy that other donors to Grenada's overall economy are delaying assistance commitments until final decisions are made on funding for the airport.

The Government of Canada's contribution to the project will involve certain discrete components which can be separated out of the project and will not interfere with other on-going activities. These are likely to include: The land use zoning study; the DVOR/DE and DVHF/DF equipments; provision of the sea rescue boat and construction of the sea rescue facility; fencing; pavement sealing; landscaping; armor protection at Hardy Bay; the sewage facility; and protection of the approach lights at the west end at the runway. In addition, the Canadians are considering a training package involving some 45 critical skills needed at the airport and supplying 5 counterpart managers for 18 months to assist the Grenadians in

running the airport. A breakout of the Canadian elements in the project and the costs involved is shown in Chapter II of this paper.

An organization chart of how the Canadian contribution will be managed is shown in Annex H.

(C) The Project Elements

In order to complete the airport several steps remain -

(1) Compensation for the land which the airport occupies has never been paid and in fact until recently the land was never legally taken by the GOG. However, the Government has passed an enabling edict so that the land now belongs to the Government. Compensation will be paid as individual claims are resolved in the future.

(2) As noted, the Plessey and METEX work will have to be completed.

(3) A major design-construct contract will have to be let with a U.S. firm to finish the work.

(4) New designs for completion of the terminal, ancillary buildings and the tower will be needed since the Cuban design may be overly ambitious. A wearing coat will have to be applied to the unsurfaced portion of the runway. Access roads,

fencing, parking apron, lighting (interior, exterior, navigational and obstruction), the telephone switchboard and other major sub-activities will need completion. The road from the airport to the Sugar Mill roundabout will have to be paved. The road from Sugar Mill into St. Georges will have to be resurfaced. Some earth-moving will be required at the airport to remove obstructions. Some protective works will be required at Hardy Bay and the western end of the runway to alleviate possible erosion problems. Navigational equipment will have to be acquired and installed. And utilities such as water telephone and electricity have to be brought in.

(5) A multitude of small design changes recommended by the Wilbur Smith and Associates, Inc., will have to be considered during the construction phase.

(6) The Director of Civil Aviation, Windward and Leeward Islands will have to certify that the Point Saline Airport, as finally constructed, meets ICAO standards as deemed acceptable for the Eastern Caribbean. Arrangements with major international air carriers may then be entered into.

With all of these major steps completed, the LIAT operations at Pearls Airport may then be shifted to Point Saline. It is assumed that not all of the 24 personnel now employed at Pearls will be willing to relocate to the Point Saline area. In addition, Wilbur Smith and Associates, Inc., has recommended a total airport staff of 92 at Point Saline. Thus, some training

will be required before the Point Saline Airport can become fully operational. The Canadian contribution will fund this training.

(D) Project Objectives

Completion of the airport at Point Saline and subsequent certification by the Director of Civil Aviation, Windward and Leeward Islands, for day/night operations by large commercial aircraft is expected to accomplish several important objectives--

(1) The ability of large commercial aircraft to fly direct to Grenada from the U.S. and other developed nations will change the nature of tourism. At the present time, one cannot fly to Grenada without transiting Barbados or one of the other Eastern Caribbean islands. Because only small aircraft can land at Pearls Airport and only in the daytime, this makes connections so difficult that overnights in Barbados or another island are the usual practice. The difficulties and additional costs involved in the overnight stop as well as the extra fare involved in using an additional airline thus give the large neighboring islands a competitive edge in attracting tourists. Large commercial jets on regularly scheduled runs as well as large charter aircraft can land regularly on the island for approximately the same cost as any flight from the East Coast of the U.S. to the Eastern Caribbean. Thus, the tourist industry in Grenada, the island's biggest money-maker, should

receive an immediate boost. This "blossoming" of the tourist industry is expected to create a beneficial long-range change in the relatively small population of the entire island, and is a major objective of the project.

(2) The direct effects of the airport with its ability to remove the single biggest constraint on growth of the island's tourist industry are substantial. Further objectives of the completion of the airport lie in the areas of increased employment and increased private investment. Increased employment in the short range will become possible through construction of the airport and its road linkage into St. Georges. Increased employment also will occur as a result of the expanding need for labor required to operate and maintain the airport. However, the single biggest effect on employment will be the opportunities created all over the island to meet the demands of a rapidly growing tourist industry. Virtually every sector of the island's economy - transportation, agriculture, energy, communications, etc. - will be affected. And growth in the increased demand for goods and services will require a comparative growth in public and private investment. Thus, increased employment and increased public and private investment become two other important objectives of the Point Saline Airport project.

Plan to Complete

In order to meet the October, 1984, opening of the facility - with completion scheduled for 1985, A.I.D. will fund and enter into major design-build contract with a either a single U.S. firm, or joint venture, which has such capability. Annex I contains the criteria, and weights to be applied to those criteria, for contractor selection. The contractor will work on a fixed price basis and be reimbursed for actual direct costs of the construction itself. Final work to be carried out by Plessey and METEX will be closely coordinated with him. Further, any elements of the remaining work to be funded and contracted for by other donors will be carried out under his direction. In addition to this "core" activity, several other actions will be required.

(1) The Government of Grenada will be required to settle the land claims.

(2) Any claims arising from the rescue mission submitted by Plessey and METEX will be settled by DOD and paid for by the U.S. However, the payment of such claims will be the subject of a separate project and the cost of such claims is not included in this project

(3) The Government of Grenada will be responsible for relocating the Medical School's True Blue Campus from the East end of the runway.

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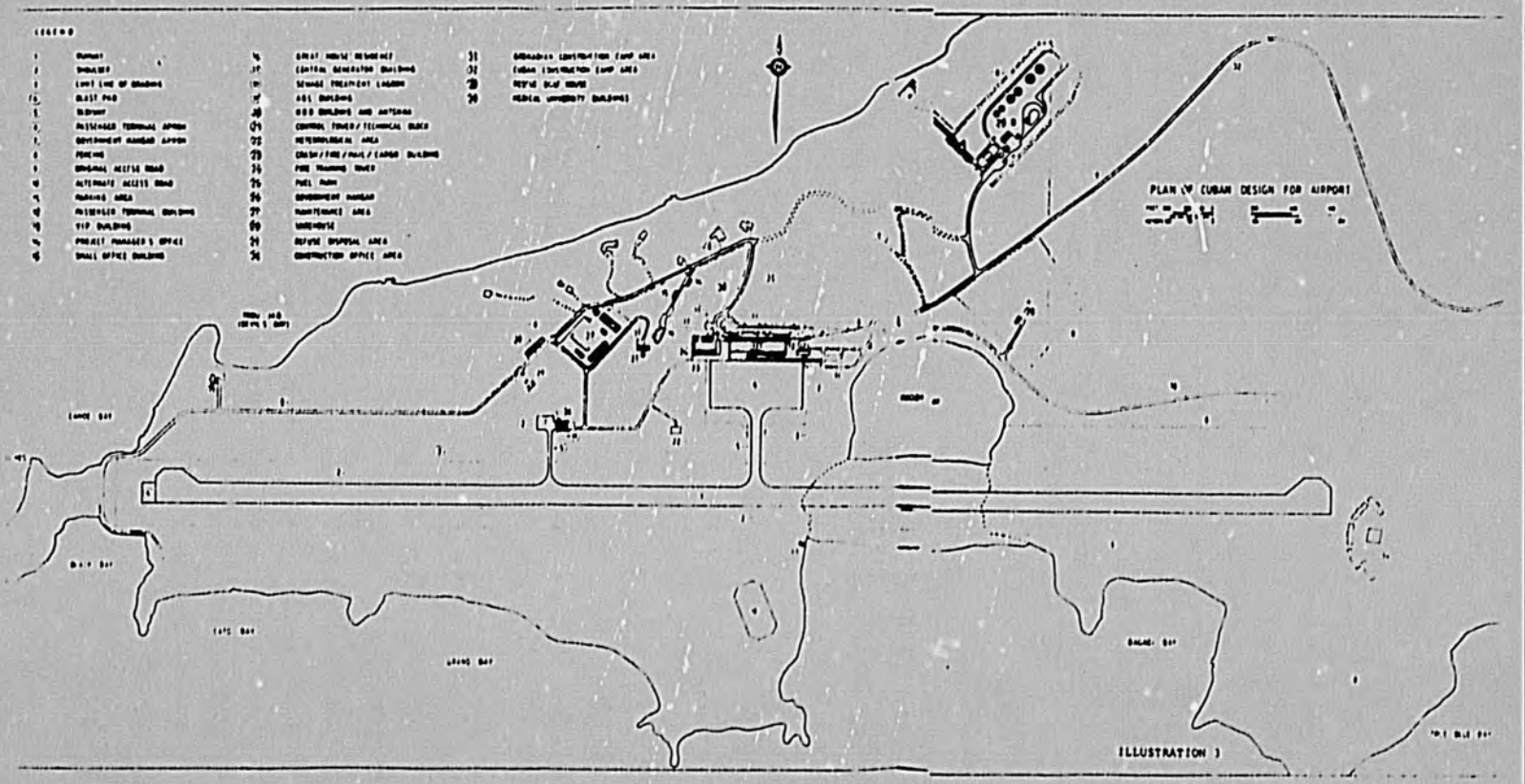

ILLUSTRATION 1

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(4) The Government of the United States will be responsible for establishing and maintaining a project management team composed of at least three people at the work site during the period April, 1984, through December, 1985, to oversee the work. The cost for these personnel will be included in the U.S. project costs.

(F) Administrative Arrangements

The airport is scheduled to begin operations of large commercial jet aircraft, both day and night, commencing in October, 1984. The October,1984, date is highly significant to the Government of Grenada for two reasons. First, elections are scheduled for that time and the Interim Government would like to demonstrate real progress in seeing that the airport is completed. Second, the 1984-85 tourist season begins at that time and the Government would like to capitalize on the Cuban-built facilities already in place. However, to open the airport by this fall requires that the Agency move very quickly on a number of complicated issues. The Cuban construction group which had been doing the civil works must be replaced. The Government of Grenada must renegotiate the Plessey and METEX contracts. At least a part of the work plan and design drawings for the original project are lost. The project itself must be redesigned somewhat, especially as concerns the terminal facilities, to conform to more realistic needs. A number of individuals will be required on an expedited basis to help put the various project contractual elements together. It

will not be possible to comply with all of the normal A.I.D. and Federal Procurement Requirements if we are to see that the project is completed on schedule. This problem is further complicated by the nature of the project - A.I.D. is not starting a new, well-designed project from scratch, but is picking up the pieces of what someone else has already planned and started.

Completion of the project will be taken over by a U.S. firm or joint venture. Normal, pure price competition is impossible because of the lack of design data to draw adequate specifications, the uncertain condition of equipment and materials on site which the contractor will use, and the midstream relationship which the contractor will have to develop with others working on site.

The scale of the project requires that the work be advertised and competitive negotiation procedures be followed. Proposals will be requested from all interested firms. A contract will be negotiated with a award made based upon price and the technical proposal. The Request for Proposals will indicate that a contractor must have design skills as well as technical expertise in construction management for all aspects of the civil works to be completed. The contract will require that the contractor provide the necessary personnel to finalize specifications of the airport, manage construction and itself complete construction of the airport. Potential contractors will be required to propose a contract price for providing the management team required to accomplish these three tasks.

Selection of the contractor will be competitive, based on both price and technical proposals prepared in response to the Request for Technical Proposals. Following the two-envelope procedure normally used for such a selection, bidders will be short-listed on the basis of technical proposals, using criteria and weights as specified in Annex I. Price will be considered only after firms are short-listed, when the evaluation panel will set a competitive price range and negotiate with the short-listed firms in the order in which they are ranked by technical criteria. The contractor evaluation panel will be constituted as required under normal AID procedures, and will conduct its work in AID/W.

The contract will call for payment to the contractor of a fixed price for all direct and overhead costs as well as profit of the contractor team. Thus, a large part of the total job cost will be completed on the basis of a firm, fixed price. In addition, the contractor will have an incentive to complete the work quickly so that he can earn a greater rate of profit on the job. Other costs involving the construction elements are shown in Chapter Two.

Because the schedule to complete the airport for limited operations by October, 1984, is so tight, a PERT chart has been prepared which describes the actions required over time. Annex C contains a list of the critical actions and the time they should take place between now and next October.

Chapter Two

Engineering Analysis

In general, the Point Saline Airport was designed to comply with ICAO standards and recommended practices. While oversized in some respects for the projected air passenger and aircraft operations, overall it is an attractive and functional facility.

The airport is designed as a one runway field without a parallel taxiway. Generally oriented east-west, the runway bearings are 100 and 280 degrees (magnetic). The runway is 9,000 feet long and 150 feet wide. Elevation at the center is 23 feet above sea level.

A section of runway about 1,500 feet in length has been built across Hardy Bay on a 500 foot wide fill. This is located about 3,000 feet from the east end of the runway.

The Terminal Building area is located on the north side of the runway at midpoint and a 600 foot long taxiway leads to the center of the aircraft parking apron. A small aircraft hangar with associated apron and taxiway is located about 3,100 feet east of the west end of the runway, and 500 feet north of the runway centerline.

A fuel farm is located in the northeast section of the airport property.

A non-directional beacon (NDB) is located on the airport 1,500 feet north of the runway centerline about 2,400 feet west of the east end of the runway.

Principal building areas aside from the Terminal Building are the Control Tower, Technical Block and the airport maintenance area.

Instrument Runway

ICAO recommends that an instrument runway should have a strip extending 500 feet on each side of the centerline of the runway with the graded area extending 250 feet on each side of the runway centerline. ICAO defines a "runway strip" as "a defined area" including the runway intended:

a) to reduce risk of damage to aircraft running off a runway, and

b) to protect aircraft flying over it during take-off or landing operations.

At Point Saline, the strip width, as constructed, was reduced from the original design (which met this recommendation), to provide a strip 250 feet wide on either side of the runway centerline instead of 500 feet. This is the most significant infringement on ICAO recommendations at the airport. Informal discussions with ICAO indicate this "infringement" will not

affect certification. Former ICAO clearance will be obtained before work commences.

As contemplated in this project, an Instrument Landing System will not be planned for Point Saline Airport. Thus, the instrumentation to be provided will result in a non-precision approach capability. It is an accepted practice that when operations are limited to non-precision approaches, a strip 500 feet wide is acceptable.

The reduction in strip width from 1,000 feet to 500 feet with the full 500 feet graded, is therefore, considered acceptable.

Apron and Runway Pavement

The apron in front of the Terminal Building is non-reinforced portland cement concrete cast in 13 x 20 foot blocks. All joints are doweled.

The Wilbur Smith Team opened test pits at the apron edge and also at the similarly constructed portland cement concrete areas at the west end of the runway. These tests confirmed that the thickness is in the 15" to 15 1/2" design range. The Project Manager reported that concrete strength in cylinder tests was typically very good and there is no visual evidence to suggest any deficiencies in concrete strength. Workmanship and quality in connection with this concrete work is considered acceptable.

The structural capability of these rigid pavements is high and considering the forecast low volume of traffic, could support loads up to and including wi le-bodied commercial aircraft now in use (B-747). None of the joints in the rigid pavement have been sealed, although the original Cuban design did call for joint sealing. The joints have been formed by casting individual blocks and not in the normal way where strips are cast and transverse joints sawn. The method used minimizes the opening of the joint due to concrete shrinkage. Further, the temperature changes in Grenada are small so that large movement due to thermal expansion and contraction does not take place. Nevertheless, there are some very narrow cracks at the joints which may extend fully through the slabs and can allow water to seep through to the subgrade. Sawing and sealing of the joints will be accomplished as a part of this project.

Runway/Taxiway Wearing Surface

The runway and primary connecting taxiway to the parking apron were designed and constructed as flexible pavements. Final Cuban design apparently consisted of 10.5 inches of coarse-graded, plant-mix asphaltic concrete laid in four lifts with a 1.75 inch fine-graded plant-mix asphaltic concrete wearing surface.

Several actual thickness measurements were made by the Wilbur Smith Team. Base coarse thickness was found to be about 11 inches. Thus, the final pavement thickness, with wearing

surface, would be in the 12.5 to 13 inch range. The underlying soil is compacted tiff, as is the case with the rigid pavement areas.

The structural capability of this flexible pavement completed to its full depth is high and again, considering the forecast low traffic volume, could support loads up to and including wide-bodied commercial aircraft now in use (B-747).

Approximately 25 percent of the wearing surface for the runway is now in place at the west end and all of the asphaltic concrete base is laid.

The airport paving has undergone considerable use over the last several months by military aircraft (C-130, C-141). Close inspection revealed no damage to the existing base or surfacing due to this activity. The only runway damage which was observed is very minor gouging at several locations where tracked vehicles were on the pavement. This is not considered serious and can be repaired easily.

Some areas of the existing wearing surface show evidence of aggregate dislodgement. This is not a serious problem; if it continues to occur, a seal coat can be applied sometime in the future.

Generally, the workmanship in the paving is acceptable. Some of the base-course mix lacks fines, but this is not a serious

deficiency and will not adversely affect the pavement's structural performance. Fines for the mix can be manufactured from the quarry rock.

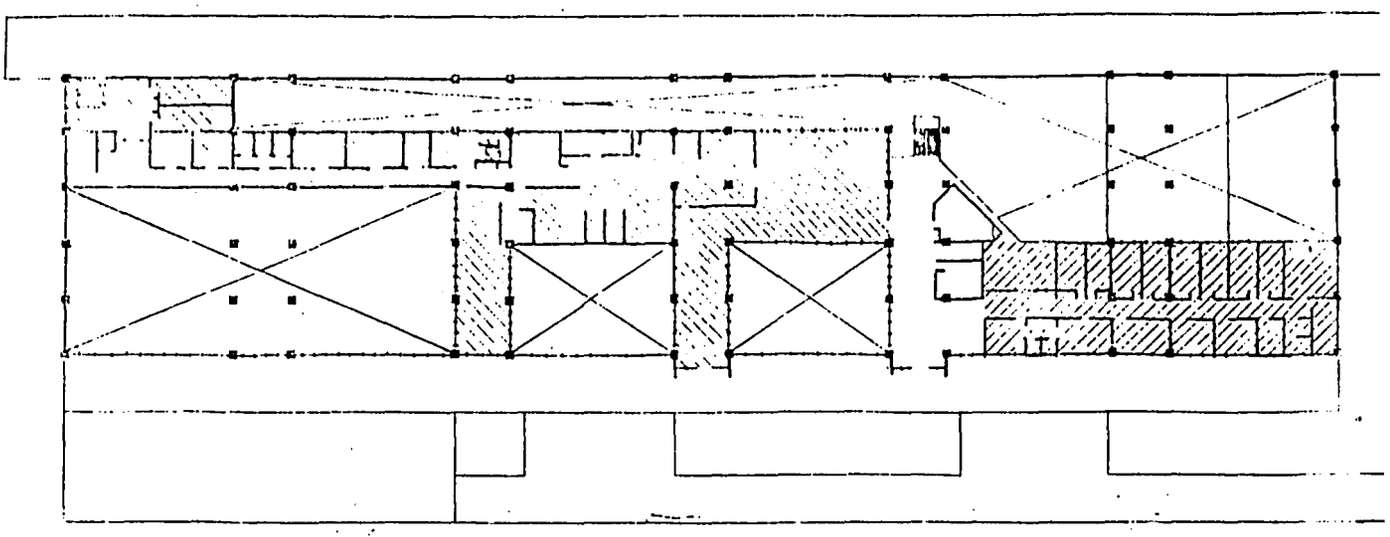
Principal Buildings

The principal buildings consist of the Passenger Terminal Building, the VIP Building and three adjacent existing buildings - the "Great House," a small office building and a residence/office building.

Passenger Terminal Building

As typical for such buildings, this structure is designed to contain the facilities for the travelling public and their support. In addition, there are offices for the management of the airport. Since this is an international airport, facilities for government control of immigration, customs and health are included.

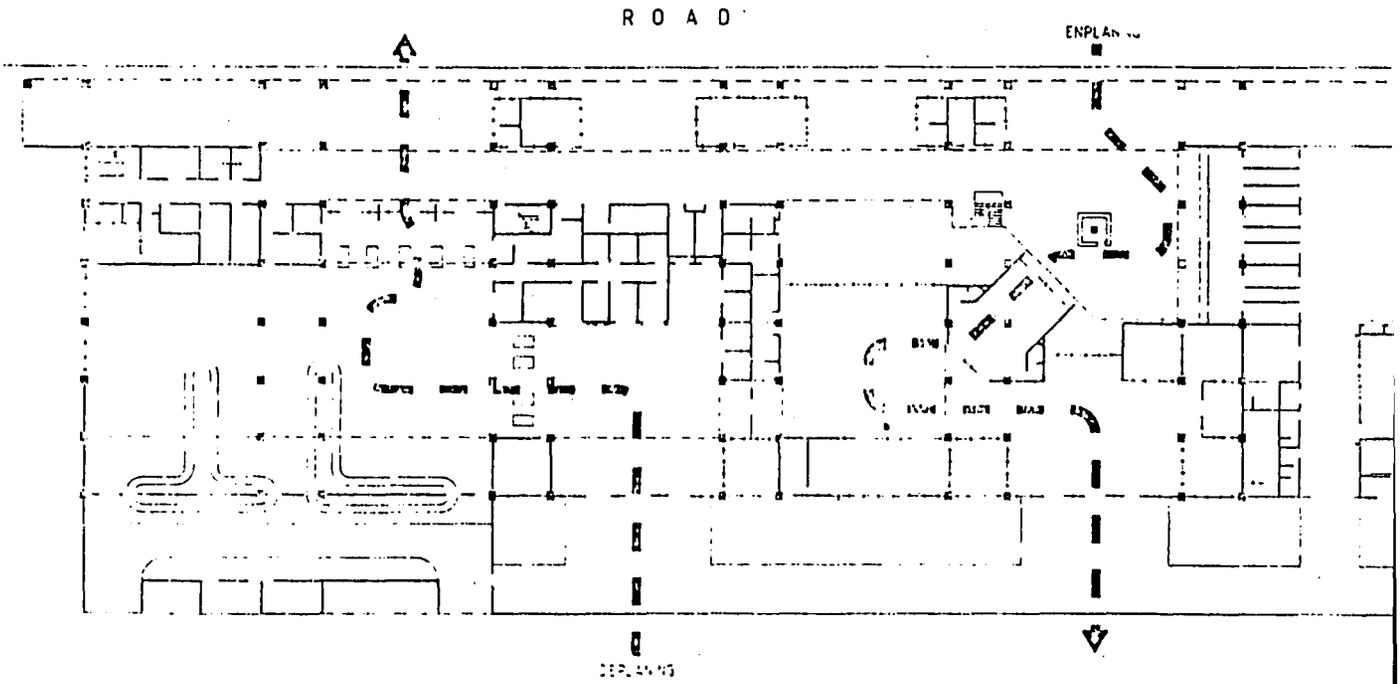
The building has a ground floor and partial upper floor. Large areas of the ground floor are open, due to the mild year round climate, and the major public spaces are generally two floors high. On the ground floor, the building is divided approximately in half with the east end devoted to emplaning passenger facilities, including airline ticketing and baggage make-up areas, while the west end houses facilities for deplaning passengers with necessary government control areas



OFFICES

RESTAURANT / BAR / KITCHEN

UPPER FLOOR PLAN



LOWER FLOOR PLAN

ILLUSTRATION 4 - TERMINAL BUILDING FLOOR PLANS

and baggage claim facilities an integral part of the layout. The upper floor consists of offices located on the east end of the building and restaurant, bar and kitchen areas occupying the western areas. A longitudinal gallery fronts the north, land side of the building at ground level and three concession areas are enclosed in the central part of the gallery between the building's main entrance and exit. There is also a covered gallery at ground level on the air-side of the building fronting on the apron. This connects back to the building passenger entrance and exit and continues from the VIP Building gallery on the east down to the projection of the baggage claim cart drive-through on the west end of the building. The gallery provides access to aircraft through "gate" openings. An observation deck fronts the building on the upper floor air-side.

The building has a steel frame consisting of six major 18-meter wide transverse bays with sloping roofs capped by monitors; the bays are separated by two-storey high flat roofed transverse six meter wide sections. Upper floors and roofs are formed of precast concrete flat slab sections spanning between the steel framing. The building is laid out on a six-meter by six-meter column grid. Exterior solid walls are concrete block masonry as are typical interior partitions. Glass window walls enclose a great deal of the building and divide up large areas of the interior. Exterior walls from the upper floor line are sheathed in metal siding and faced with stucco below this level. Smooth membrane roofing covers the roof areas.

Terrazzo is used typically throughout as a floor finish; plaster for wall surfaces; and acoustical panels for ceilings. Toilet rooms and kitchen areas have ceramic tile on the walls.

Enclosed areas are cooled by air conditioning systems which are typically ducted from units which serve each major functional area of the building.

Included in the building are cabinets and counters for the airlines, offices and concessions; kitchen preparation, storage, cooking and serving equipment; a public address system; a flight information system with multiple displays; a telephone intercommunication system; baggage conveyers and two baggage claim conveyers.

The building has an area of approximately 103,000 square feet; this a pro-rated area allowing discounted amounts for the upper part of the two-story spaces, unenclosed and coverage spaces and decks.

The overall building is approximately 50 percent completed. The primary steel structure, floors and roofs are in place. The north gallery framing and roof deck are approximately 70 percent complete; the south gallery has not been started. Masonry walls and partitions are essentially completed. No window walls have been installed; no exterior metal siding is in place; exterior stucco is about 90 percent completed, and

the roofing is about 50 percent finished. No terrazzo flooring has been placed on the upper floor and that in place on the lower floor must be finished by polishing. Interior wall and ceiling plaster is almost completed. No acoustical ceiling is in place. Electrical and communication system conduit is generally completed and a few high light fixtures are in place, but no wiring or devices have been installed. Plumbing system piping is in place; no fixtures have been installed. The air conditioning systems have not been started. No cabinets, counters, kitchen equipment or baggage conveyers have been installed.

Some minor damage to the building occurred in the rescue mission and later use by the military, but overall the building construction is in good condition. Cased stacks of precast concrete planks were used as barricades and these suffered some damage. Some finish materials present in the building but not installed were used for temporary partitions and protection and were damaged. Considering the circumstances, the damage was minimal and the fabric of the building in place is essentially unharmed.

Construction Equipment

While some of the construction equipment presently at the site is still operable, most is unreliable. An equipment specialist is now at the airport making these determinations.
The contractor who gets the job will have to furnish any

necessary equipment to complete the airport as planned. It is planned that most US-procured equipment will be turned over to the GOG following completion of tne work.

(B) Economic Analysis

The Wilbur Smith and Associates, Inc., report included an economic analysis which compared benefit and cost streams using both the total cost of construction as well as only the cost to complete the airport. In the latter case, the $43 million, or so, of construction was considered to be "sunk costs." The assumptions used in the analyses were highly conservative in nature. It was assumed that tourist dollars spent each day would amount to only $50, while the tourist attracted to the island as a result of the project would rise from 32,000 in 1985 to a 50,000 level, remaining constant thereafter. Or, from a with-and-without project perspective: As a result of the project, the total number of tourists was projected to be 32,000 in 1985, rather than 30,000 without the project, reaching a maximum of 100,000 rather than 50,000 by 1990. No allowance was included for tne salvage value of the new airport at the end of the thirty year analysis period, although an airport rehabilitation cost of $10.6 million was included in the year 1995. It was assumed that the $50/day figure per tourist would remain constant when it is highly likely that expenditures per tourist will increase in real terms over time. And no multiplier, or ripple effect, was included with tourist expenditures despite data indicating this multiplier to

be 1.4 of each dollar spent.

Despite this conservative approach, it was found that only a relatively small percentage of generated tourist expenditures need to be allocated to the airport to offset the estimated airport completion costs of $24 million. When only new construction costs are considered, the benefit/cost ratio held to one and the discount rate set at 5 percent, only $6 of the $50 per day of generated tourist expenditures need be attributed to the airport's completion costs. A discount rate of 10 percent requires a $12 attribution. And a discount rate of 12 percent requires a $16 attribution. Thus, the project to complete Point Saline Airport is considered economically feasible by the Wilbur Smith and Associates, Inc., team. This economic analysis performed by Wilbur Smith and Associates was quite good, given the severe time and resource constraints forced on the contracting team.

The consultant developed an admitted conservative estimate for the expected daily tourist expenditure ($50) and estimates for the number of additional tourist days that can be expected over time-- not just as a result of the airport expenditure, but also as a result of improved roads, communications, sewage, water, and new hotels, etc. In other words, the consultant recognized that a number of wide-ranging infrastructure improvements will need to made if his predication of increased tourist days is to be realized. The usual with-and-without project analysis for this kind of project is extremely data

demanding and complicated, requiring production data for the various tourist-related service activities, estimating the additional benefits that accrue to the rest of the economy as a result of the improved infrastructure. The consultant apparently decided that there was not enough time or data to carry-out the traditional with-and-without analysis. As an alternative approach, he asked the question, "How much of the additional tourist expenditure (benefits) must be said to result from the airport expenditure in order to produce a B/C ratio of 1 at 5, 10, and 12% discount rates?" Based on the above approach, the analysis determined that 12, 24, and 32% of the $50 would have to be ascribed to the airport construction to produce a B/C ratio of 1 at 5, 10, and 12% discount rates respectively. Implicit in this approach is the belief that, once these percentages of the tourist expenditure are calculated, an expert in the field can reasonably conclude that the project is feasible. And, in fact, that is precisely what the consultant did immediately following the sentence containing the 12, 24, and 32% figures: Page 6-23 the report states, "It is, therefore, apparent that...the project is feasible."

Unfortunately, because of time constraints, the consultant could go no further. Without some other information, such as an estimate, regardless of how preliminary it may be, of the extra infrastructure costs required to complement the airport costs, we have no benchmark against which we can determine how reasonable it is to assume that the 68% of $50 is sufficient to cover the other costs and still produce a B/C ratio of 1 at 12%.

Bureau economists, thus, modified the consultant's effort, adding assumptions and analysis where appropriate, in order to be able to arrive at a defendable position, be it in agreement or disagreement with the consultant's conclusions. From this additional analysis, we have been able to conclude that even with very conservative tourism estimates, the project will obtain an internal rate of return (IRR) in excess of 5%, an when reasonable adjustments are made to these conservative values, we are able to stipulate that the project will generate an IRR of at least 12%.

(C) Cost Estimate and Financial Analyses

Considerable time was expanded by the Wilbur Smith Team in estimating the Cuban work and the amount already expended (sunk cost). This effort was severely hampered by lack of any hard information in the Cuban area of operations, although the Grenadian Airport Manager was extremely helpful and did provide as much information as he could. The two exceptions are information available from the Plessey and Metex contracts. Using available project data and documentation, knowledge of comparable work, and information gathered on local conditions and costs, and in many instances educated estimates, costs to complete the Airport to the recommended scope were estimated.

Cost of Cuban Design

The Grenadian Airport Manager's most recent estimate of cost for constructing the Airport totals approximately $90,000,000. This includes $1,800,000 for land acquisition, costs for construction plant and equipment, engineering and supervision, and "physical and price" contigencies of about $22,000,000 to cover escalation, inflation, the uncertain cost of money from various resources, and other information developments. This estimate, dated August 1981, was updated since the rescue mission by the Airport Manager. The level of magnitude is consistent with the Wilber Smith Team's findings, and was, therefore, accepted and used in the subsequent economic analyses.

Sunk Cost

Because of the terms of the Plessey and Metex contracts which call for payment for installation of materials upon shipment and not upon actual accomplishment, the sunk cost and percent of completion of construction, do not equate. In addition, accounts for expenditures in any detail and accuracy were not available, and no attempt was made to perform an audit of any accounts of expenditures. A short summary of the status of the construction was provided which also estimated funds required to complete the project. This summary, dated November 1983, was prepared by the GOG Airport Manager. It estimated the value of work completed as $43,077,000 which is reasonable based on detailed evaluations of all available information.

On this basis, construction completion costs are summarized below. As indicated, they include indirect costs which a prime contractor (or contractors) will incur for supervision, personnel living expenses, construction support, facilities, telephone, taxes, surveying, etc.

Also, the construction completion costs do not include: (1) any sums which will become due to Plessey or METEX on shipment of further material under their contracts; (2) estimated land acquisition costs, and (3) direct costs for the Government for administration and overall management.

The estimated construction costs of $15,000,000 include an amount of approximately $1,200,000 for replacement of the Cuban construction plant and equipment repair (earth-moving equipment, asphalt plant, concrete batch plant, etc.).

U.S. Construction Cost

A. Roads		
(1) Improvement Sugar Mill to True Blue		123,000
(2) Access Road and Terminal Parking		630,000
(3) Internal Roads		341,000
(4) Bay Access Road		30,000
	Sub Total	1,124,000
B. Airfield		
(1) Earthworks		81,500
(2) Runway, Taxiway and Markings		1,185,000
(3) Pavement Shoulders		428,000
(4) Joint Sealine		45,000
	Sub Total	1,739,000
C. Utilities		
(1) Water		189,000
(2) Sanitary		157,000
	Sub Total	346,000

D. Off-Field Obstruction Removal		240,000
E. Fuel Farm		
(1) Dykes, Earthworks, and Pavements		160,000
(2) Pipeline and Mooring		800,000
(3) Additional Road to Fuel Farm		500,000
	Sub Total	1,406,000
General		
(1) Crushing Plant		680,000
(2) Additional Equipment		839,500
(3) Rehab Construction Camp		400,000
(4) Additional Parking		200,000
(5) Road Sugar Mill- St. Georges		525,000
	Sub Total	2,644,500
G. Indirect Costs at 73.3%		5,500,000
	Sub Total	13,000,000
Continguency (15%)		2,000,000
Total U.S. Construction Cost		15,000,000
A-E and U.S. Prime Contractor Cost (including Overhead and fee)		3,500,000
Total U.S. Construction Costs		18,500,000
US Project Staff and TA to GOG		500,000
Total U.S. Costs		19,000,000

CIDA-Financed Components of Project

	(US$)
Zoning Study	$164,000
Hardy Bay Sea Wall	581,000
Protection of Approach Lights	328,000
Rescue Facility and Boat	304,000
ATB Sewerage	196,000
Security Fencing	188,000
DVOR/DME	800,000
DVHF/DF	180,000
Pavement Sealing	76,000
Land Scaping	880,000
Sub Total	$3,697,600
Consultant Services	$ 400,000
Training (45 people) and five counterparts managers for 18 months state-up operations	$1,200,000
Total:	$5,297,600

Total Project Costs:	$24,297,600
GOG claims (Plessey)*	$1,600,000*
GOG claims (METEX)*	$ 500,000*
Land Acquisition*	$1,800,000*
Relocation True Blue Campus*	$ 300,000*

*Note: These costs are not to be funded by the proposed project. The land is to be acquired and paid for by the Government of Grenada which is responsibile also for the relocation of the True Blue Campus. The Plessey and METEX costs are to be funded from a separate A.I.D. project (Project No: 543-0010) which covers all rescue mission related claims against the U.S.

Priority Items for U.S. Construction

In order to have the airport operational by October, 1984, it is essential that certain priority items of work be completed. The Request for Proposals cites these items as the following:

It is required that the Contractor make every effort to assure the opening, by October 15, 1984 of the Point Salines International Airport to limited day and night operations by commercial and charter jet aircraft under safe conditions meeting all licensing and operational requirements. It is essential that the work items listed below be completed on a top-priority basis.

1. Runaway, Taxiway and Apron

a. Completion of Paving (U.S. Contractor). In general, this means completion of the 1.75-inch wearing course, presently about 25 percent complete.

b. Fine Grading and Stabilization of Shoulders (U.S. Contractor).

c. Completion of Overrun Area, East End of Runaway (U.S. Contractor). Area lacks about 200 feet of compacted fill and final grading. Note that medical college buidlings msut be removed before this work can be accomplished (Government of Grenada action).

d. Runaway, Taxiway and Apron Marking (Plessey provides paint and equipment; U.S. Contractor does the actual marking).

2. Completion of ATC Tower and Technical Block Building.

a. Structural Completion (U.S. Contractor). This work is, reportedly, about 98 percent complete.

b. Equipment Installation (Plessey). This work has been estimated to be about 10 percent complete. Note that final completion of all planned equipment is not required (or possible) for October 1984 opening.

3. Installation of Runaway, Taxiway and Apron Lighting (METEX).

4. Installation of Obstruction Lights (METEX): Obstruction Reduction/Removal (U.S. Contractor).

5. Installation of Air-Ground-Air Communications System (Plessey).

6. Establishment of a Crash, Fire, Rescue Facility.

a. Building construction (U.S. Contractor responsibility) is about 98 percent complete.

b. Equipmnt (Plessey) is about 10 percent complete.

7. Establishment of a temporary facility for the purpose of processing, emplaning and deplaning passengers, pending completion of the Terminal Building. It is understood that LIAT will assume this responsibility.*

*Note: It is expected that the main terminal block can be completed for limited operations by October, 1984. If so, the temporary facility will not be needed.

Financial Analysis

The estimated total cost of the project is $24 million, of which A.I.D. will Grant fund $19 million, with the balance to come from other donors.

No factor for inflation has been built in because a contract for the project is to be signed in late May, 1984, and substantially completed by October, 1984 with final work to be completed by December, 1985.

The financial plans and estimates presented in this Project Paper are not intended to restrict reasonable flexibility in realigning uncommitted funds to meet essential implementation requirements.

The contribution of the Government of Grenada is expected to be the substantial operating costs of the Airport. As noted in the Wilbur Smith and Associates, Inc., Report, these are expected to be: $458,580 during the base year of 1985, $1,834,320 during the 1985-1990 period, $2,483,350 during the 1990-1995 period, and $2,770,850 during the period 1995-2000. Thus, during the period 1985-2000, operating costs of the Airport will total $7,547,100, or well over the 25 percent level that A.I.D. usually requires in the way of host country contribution. Considering that the life of the project is expected to Span over 30 years, the Government of Grenada's eventual contribution will be well over double the first fifteen years and thus over double the 25 percent figure.

Operating Costs Point Saline Airport

As noted by the Wilbur Smith Team (see Attachment A, Chapter II), the operating costs of the airport at Point Saline are expected to be $274,120 for personnel and $108,030 for supplies and maintenance in the year 1985. With contingency, the Wilbur Smith Team estimated that operating costs would be $458,582 in 1985, rise to $496,670 by 1990, to $554,170 by 1995 an $642,900 in the year 2000. Landing fees were expected to accrue $99,900 in 1985, $139,200 by 1990, $183,100 by 1995, and reach $281,100 by the year 2000. In addition, fees for navigation aids and communications use were expected to garner $46,200 in 1985, $53,700 by 1990, $62,100 by 1995, and $72,800 by the year 2000. Lastly, receipts for rental space at the airport were expected to be $39,200 from 1985 to 1990 and $52,200 per year for the following ten years.

It is obvious from these figures that substantial additional revenue must be generated to give the airport a positive cash flow. Using the base year of 1985 as an example, costs will be $458,580 offset by $99,900 in landing fees, $46,200 in Navigation Aids and Communication, and $39,200 in rental space. This leaves a short-fall of $273,280. The traditional way to handle this problem is through the levying of an airport departure tax. It such a tax were levied, it would need to be in the order of $4.00, as there will be some 42,600 non-tourist passengers and 32,000 tourist passengers emplaning at Point Salines, according to the current passenger forecast. Another

way would be to charge only tourists, in which case the tax would rise to $9.00. And yet another way would be to place a special sales tax on tourists. Assuming an 8-day stay and a daily expenditure of $50 or $400 per tourist, this would require raising the government sales tax from 71/2 percent to 10 percent for tourists, a less visible means of financing the airport. Probably the best way would be a combination of airport departure tax and an easily collectible government hotel tax. Both would constitute modest fees while at the same time raising the revenue needed to pay airport operating costs.

(D) Social Soundness Analysis

Socio-Cultural Conditions and the Impact of Point Salines Airport

The present population of Grenada is officially estimated as 110,000, but may be less (perhaps 90,000) as a result of immigration during the Bishop years. Also, there is heavy migration of Grenadian males to North America and other Caribbean islands in pursuit of employment.

The island is divided into six parishes with the Parish of St. George being the most heavily populated. The beach at Grand Anse Bay in that parish is the focal point of the tourist industry. The airport at Point Saline begins at the south west tip of the parish and is oriented in an east-west direction. Although current data is lacking, it appears that over a third of the work force of 38,000 is now either unemployed, or

underemployed. A substantial increase in unemployment was one immediate effect of the rescue mission because of the stoppage of work at Point Saline Airport and a sharp drop off in tourism during the 1983-1984 season. The recent resumption of cruise shipping, tourism, and the needs of the U.S. Country Team and others working in the U.S. program have partially alleviated that situation, but the unemployment problem is still critical.

As noted by th Grenadians themselves, their principal industry is tourism and the single biggest impediment to increased tourism is an airport large and modern enough to land big jet aircraft during both day and night. And while the present infrastructure to support increased tourism will have to be expanded, such an expansion would never occur without first being able to fly tourists directly to the island.

One immediate effect of the resumption of construction of the airport will be the re-employment of the workers laid off following the rescue mission. The scheduling of large jet aircraft for direct flights to Grenada, as well as transit flights, from both North and South America will sharply increase the tourist industry right away. Because of the labor-intensive nature of providing services to tourists, one would expect a corresponding sharp increase in employment. However, once that point is reached, the cap on increased tourism will no longer be the airport, but the limitations of the infrastructure serving tourism. Increased public and private investment will be required at this point, and the rate

at which it occurs will pretty much set the rate of tourism growth.

As this cycle in the foreseeable growth of the tourist industry occurs, the island's people should prosper accordingly. The labor-intensive nature of the tourist industry should create substantial additional employment. Further, the multiplier effects of monies earned by construction of the airport and increased services needed in the growing tourist sector should further increase demand with a concommitent increase in employment. Lastly, Point Salines Airport will make possible some growth in those export industries which require regular, dependable air shipment. The ready-to-wear sport clothing industry in Grenada, which in 1982 provided $2.4 million (13.7 percent) of domestic exports, will benefit because of the fiercely competitive nature of the industry and the necessity to meet firm delivery dates. Opportunities exist at present for a dramatic expansion in the sport clothing industry, due principally to five reasons.

First, there is a small but active industry already in place which could serve as a nucleus for future development. This industry employs some 310 people, as follows:

Company	No. of Employees
Deco	110
Hadid	60
Liberty	60
Johnson	50
Ecstacy	20
Williams	10
Total	310

This small industry not only contributes to Grenada's exports, but provides clothing for domestic use as well. Discussions with trade and government people indicate that the entrepreneurs in this area are alert to investment opportunities and are particularly interested in joint ventures involving U.S. firms. With separate financing a series of investment promotion and financing activities are now starting in Grenada, including RDO/C's PDAP, CAIC, BIMAP and CSFC programs, plus OPIC and DOC programs as well.

Second, Grenadian tax laws permit duty free entrance of raw materials for processing. This allows goods to be cut elsewhere to pattern and forwarded to Grenada for final sewing.

Third, Grenadian workers are industrious and supervision requirements are not high, resulting in reduced overheads.

Fourth, American initiatives following the rescue mission have opened up some possibilities for local industry to engage in joint business ventures, which were not previously available.

Fifth, ready-made clothing is light in weight, and although bulky, can be compressed for shipment. Further, ready-made clothing embodies styles which may have a time dimension, and would therefore be amenable to air shipment.

In sum, the industry offers a good potential for the development of outgoing air cargo.

Other Industrial Prospects

Possibilities exist in both the handicraft and handbag industries for development of air cargo. However, neither of these industries is presently as well established as the ready-made clothing business.

Agriculture

In considering agriculture as a potential source of air cargo, cut flowers deserve special treatment. They are light in weight, have a high unit value, and are very perishable. All of these qualities make them prime air cargo potentials. However, they are also bulky and therefore are generally shipped with heavier cargo. Prospects for air cargo development, recommended by Agriculture Industry representatives (in order of priority), include:

Anthurrium lilies
Poinsettias
Evergreens
Orchids
Aeroids: such as cannas

Certain food products currently raised on the island were suggested by Ministry representatives as possible candidates for air shipment. In order of priority, these are:

Mangoes
Eggplant
Avocado
Red tannia
Callaloo
West Indian cherry
Small yams

Sweet potatoes
Eldoe
Sorrel
Okra
Pumpkins

Even a cursory examination of the above list will reveal products which are probably not of sufficient unit value to warrant air shipment, if shipped separately. However, if shipped along with higher priced goods, to use space which would otherwise be wasted, there still might be a profit margin.

Certain of the above products are already being exported. For example, eggplant exports to Europe jumped from 15,000 lbs. in 1979-80 to 109,000 lbs. in 1981-82, while 410,700 lbs. of mangoes were also shipped to Europe in 1982. There is also significant huckster trade of vegetables to Trinidad (nearly 400,000 lbs. in 1982).

The above concentrates on crops other than the traditional Grenadian big four, i.e., cocoa, bananas, nutmeg and mace, since transport channels are already well established for these crops.

In sum, Point Saline Airport will create new jobs in the industrial and agriculture sectors and may increase personal income to the point where it will affect the drain on the island caused by the migration of males seeking more lucrative careers.

The Nature of Increased Tourism and Its Effect on Grenadian Culture

The present tourist industry in Grenadian caters to wealthy clients well able to afford the extra time and money it takes to reach the island. With the airport, increased hotels and other tourist infrastructure may come low-cost package tours with a substantial burgeoning of the tourist population. High rises, golf courses, recreational activities and special tours to more remote but scenic spots on the island will probably occur. Television will probably come to the island. Many of these developments have negative cultural as well as positive economic effects. However, it should be noted that much of the increase in tourism will be confined to the Grand Anse Beach area. Thus, as Waikiki Beach is the target for most of the tourists to Oahu, Grand Anse Beach should absorb the increased flow to Grenada. And whatever negative effects occur on this unspoiled little island as a result of increased tourism, increases in personal wealth and public revenue should bring with it an increased standard of living and real economic opportunities for the islanders.

Women in Development

As noted, many Grenadian males leave the island in search of higher wages. Thus, much of the work on Grenada proper - such as some of the unskilled physical labor involved in road construction is done by women. Practically all of the

handicraft and clothing industry are carried out by women. Much of the services rendered to tourists are performed by women. Thus, while many of the construction activities at the airport proper are expected to be carried out by men, women will comprise a significant portion of the labor force. And it is women for the most part who will prosper from the increased employment opportunities created by increased tourism.

(E) Environmental Analysis

Annex D contains the results of an Environmental Analysis carried out by Tippets-Abbett-McCarthy-Strotton during March 15 - 19, 1984 at the project site. The principal data sources used were:

-- Master Plan: International Airport, Point Saline (1981) by the Cuban Ministry of Transport (MITRANS);

-- Design drawings and specifications for MITRANS.

-- Prefeasibility Study for the Grenada Airport (January 1984) by Wilbur Smith and Associates; and

-- Interview with knowledgeable Grenadian Government officials, USAID staff, local fishermen and others.

While most findings of the TAMS Team were positive, and the TAMS recommendations will be followed, two additional points may be made-

(1) TAMS assumed that the fuel farm was designed to withstand 100 mph winds. During the construction phase of this project, we shall ask the prime contractor(s) to check the validity of this assumption, and

(2) The partial and remaining armor protection at Hardy Bay will be completed so as to enable the shoreline to withstand hurricanes and sea surges common to the area.

Chapter III

Implementation Arrangements

A. Implementation Plan - Construction

In order to complete the airport, the Government of Grenada will need some technical assistance. At present, the Government of Grenada does not have the capability within its civil service to direct the necessary architectural and engineering work for required changes to the project. In the past, these functions had been performed by Cuba. And in this proposed airport completion effort, the prime contractor will perform the same function with A.I.D. management oversight.

At present, the Government has nominated a Project Expediter who will serve as Special Assistant to the Chairman of the Interim Government to be responsible for completion of the airport. That official may need an experienced contract officer to assist him in resolving any Plessey and METEX contract problems, an electronics specialist to verify the Plessey and METEX findings, a lawyer to assist in resolving the question of land compensation, and possibly other specialists. It is anticipated that A.I.D., or one of the other donors will fund this assistance. In summary, the various functions to be performed by the Governments and institutions involved in the project will be as follow:

1. The prime contractor

Funded by A.I.D., the prime design and construction contractor will be responsible for completing the work at Point Saline so that the airport will meet required international standards. In carrying out this job, he will work closely with Plessey and METEX to see that the work of those firms under their renegotiated contracts is properly carried out. Maximum use of local Grenadian labor is obligatory. Any major sub-contracts the prime contractor utilizes will have to be approved by A.I.D. as well as the Government of Grenada. The prime contractor will also work closely with any contractors funded by the other donors to the project. The prime contractor is to have the airport operational by October, 1984.

2. U.S.A.I.D.

U.S.A.I.D. will utilize the services of a Project Manager resident in Grenada to oversee the entire project. His/her responsibilities will include full coordination with the Government of Grenada and the other donors involved in the project as well as day to day monitoring of the prime contractor. To assist the U.S.A.I.D. Project Manager (contract or direct-hire), he/she will have two specialists who will comprise the resident management team and the staffs of U.S.A.I.D. and the RDO/C in Bridgetown as bak cup. One suggested staffing pattern would comprise a Finance Officer, an Engineer and a Contract Officer. Further, it has been decided

that the Contract Officer function will be carried out by an AID/W Contract Officer on TDY for a minimum of 60 days with additional assistance provided by RDO/C as may be needed. Any required legal services could be provided out of AID/W and/or RDO/C as cirumstances dictate. The USAID Project Manager will be under the overall direction of the USAID Representative. A schematic of the proposed administrative arrangements is shown in Annex H.

3. Other Donors

While the exact nature of the contributions of the other donors is not finalized at this time, we do know that Canada's contribution will include several elements of construction as well as training. The Canadian construction elements were chosen based upon criteria: (1) That the Canadian work did not have to be completed in order to open the airport by October, 1984; and (2) That the Canadian construction work would not compete for materials, construction equipment and labor required by the prime U.S. Contractor. The Government of Grenada will require that the Contract agreement with the Canadian-funded firm(s) stipulate that the firm(s) engaged witl work under the direction of the prime contractor building the airport. The Request for Proposals describes the relationship involved as the exercise of "oversight authroity and coordinating responsibility for work which will be accomplished under contracts let by other donors". Annex H contains a schematic of the proposed administrative arrangements with

Canada. The contributions of other donors to the project are most likely to take the form of training and/or the supply of specific materials and equipment.

4. The Government of Grenada

The Government of Grenada through its Project Expediter will be responsible for coordinating the activities of all the donors; making final decisions required during the construction phase; assisting in the settlement of Plessey and METEX claims; settling the land claims; and otherwise seeing that the airport in complete in October, 1984.

Implementation Plan - Airport Management and Operations

While only 24 personnel are presently involved in the operation of the Pearls Airport and only 44 were estimated as needed in 1985, some 92 personnel are seen as required for adequate operation of the Point Saline facility for 1985. The listing of required personnel shown in Attachment A, is self-explanatory, with some exceptions. For example, with the tower separated from the Terminal Building, the Aeronautical Information/Meterology Service will have to be located in the latter.

The recommended manning level is not considered excessive. For example, Coolidge Airport at Antigua, with 174 employees, had 30,880 aircraft operations (landings plus takeoffs) in 1982.

Some 92 employees are recommended for Point Saline for 1985, although only 11,120 aircraft operations are anticipated. In other words, the 1985 Point Saline personnel level would be 53 percent of the present Coolidge level, although the Point Saline workload would only be 36 percent of that of the Antigua field.

After the initial staffing is operational, only relatively modest increases are required in subsequent years. This is borne out by the Table shown as Attachment B, which shows the increases in expense allowances proposed for each of the four forecast years. Total estimated expenses for these years are: 1985 - $458,580; 1990 - $496,670; 1995 - $554,170; and, 2000 - $642,900. It is of interest here that the total of 1985 ($458,580) is equivalent to 67 percent of the Collidge Airport total for 1982 ($680,400 - spent and committed), and the latter total excludes utilities and significant labour costs.

It will be noted that the expense items listed do not contain an annual allowance for amortization of capital costs. It should also be pointed out that Plessey and METEX are to provide training on all equipment which they install.

The METEX contract for the airfield lighting includes training for operation and maintenance of these installations. Similarly, the Plessey contract includes training for the installations for which they are responsible. Thus, the initial required training for the maintenance of the airfield

lighting, the air traffic control, communications and meteorology equipment as well as the mechanical and electrical equipment furnished by Plessey are provided. Training in operations of the air traffic control system has been provided by the EEC. All other needed training will be provided by Canada.

The transfer of the airport traffic controllers and flight briefing personnel from Pearls Airport to the Point Saline Airport will serve to provide the trained personnel required initially. Similarly, trained firemen will be transferred from Pearls Airport to Point Salines Airport.

In the longer term, as additional or replacement personnel are required, training for the aeronautical services and fire fighting services is available in the Caribbean area as well as in the U.K. or U.S.

In the other areas of mechanical and electrical equipment, on-the-job training of personnel assigned to maintenance and operation will be carried out, and formal training in these areas may be required.

With these provisions, the allowance for training is considered generous.

(B) Conditions, Covenants and Negotiating Status

The standard conditions precedent to initial disbursement of the Grant will apply. These involve the designation of official Government of Grenada representatives with the provisions for their specimen signatures and the provision for a legal opinion concerning the validity of the Grant Agreement. An additional condition precedent will concern the establishment by the Government of an organizational entity acceptable to A.I.D. with the required skills to administer the airport completion project.

A.I.D. approval of procurement procedures and selected documentation will be required if host country contracting is a condition precedent to any disbursement for host procurement of goods and services financed under the Grant.

These conditions precedent may be modified, or waived, as appropriate by the USAID/Grenada Representative, or other A.I.D. officials, subject to the limits of conferred authority and applicable A.I.D. policies. In addition, several covenants will apply to this Grant.

The Government of Grenada will covenant that within ninety (90) days it will develop and submit a proposal as to how it will provide adequate funding to meet recurrent costs of operating and maintaining the airport.

The Government of Grenada will covenant that it will make every effort to arrive at a quick resolution of contractual problems in the Plessey and METEX contracts so that work on those activities may be resumed.

And the Government of Grenada will covenant that it will make every effort to arrive at a quick and equitable resolution of claims arising from ownership of the land on which the airport is built, as well as the relocation of the True Blue campus at the east end of the runway.

The Ministry of Construction has reviewed this Project Paper and discussed it with USAID/Grenada. The Government of Grenada, acting through that Ministry, is in agreement with the design and plan of the project and with the conditions to be applied to this Grant. The Chairman of the Interim Government has formally requested A.I.D.'s assistance in carrying out the project.

Attached herewith is a memorandum of understanding between the United States Government and the Government of Grenada in regard to the Point Saline Airport. When signed this memorandum will affect the conditions precedent and covenants proposed above and they will be modified accordingly.

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MEMORANDUM OF UNDERSTANDING BETWEEN THE UNITED STATES GOVERNMENT AND THE GOVERNMENT OF GRENADA IN REGARD TO THE POINT SALINE AIRPORT PROJECT:

The main objective of the project is to complete the Point Saline Airport to standards acceptable to the ICAO within the shortest possible time frame. The United States Government, acting through the Agency for International Development (A.I.D.) will initiate an administrative process designed to secure funding for the project, in accordance with the laws and regulations of the United States. It is also anticipated that the Canadian Government and other donor Governments and International Agencies will provide funding. Upon successful completion of the A.I.D. funding authorization process, it will be necessary for A.I.D. and the Government of Grenada (G.O.G.) to negotiate and sign a Project Agreement. That Agreement will describe the activities to be undertaken by both parties toward completion of the project. It is agreed that the following steps will be taken on an expedited basis, and prior to the execution of the Project Agreement, to facilitate Project implementation.

1) The Parties will establish a Management Unit which will be given the requisite authority, and charged with Project implementation. A diagram of the management unit is shown in annex A. The Government of Grenada will establish a Project oversight Committee. The Committee will take those policy decisions required to be made during the start up phase of the project. During the Implementation phase of the project the Committee will meet to review progress of the work and assist in the resolution of any issues brought to its attention by the A.I.D. Office of the Project Manager. The Committee will appoint one of its members as a laison with the A.I.D. Office of the Project Manager, and that individual will give prompt assistance to the A.I.D. Project Manager in expediting actions, approvals or procedures requested by the A.I.D. Project Manager. Any suggestions in regard to the project which are recommended by the Oversight Committee will be communicated directly to A.I.D. through the Director of USAID/ Grenada. The Office of the A.I.D. Project manager will be charged with the day to day implementation of the Project. That Office will be staffed with technically competent individuals to be contracted by A.I.D. They may include an engineer with knowledge of civil works, an individual with experience in the construction of airport facilities, and at certain times, an individual knowledgable in U.S. Federal Aviation Administration requirements and procedures.

2) A.I.D. will initiate the procurement of services of a design-build-construction management firm in the United States, to be the prime contractor on the project. That contractor will receive a fixed fee for its services, and will accomplish the remaining work tasks necessary to complete the airport on a cost basis. The prime contractor will be charged

with the coordination of all other contractors working on the project. The contractor will be supervised by the A.I.D. Office of the Project Manager.

3) A.I.D. and the G.O.G. will proceed immediately with the renegotiation of the contracts presently in force between the G.O.G. and Plessey Airports Limited and Metex. It is anticipated that the additional costs required to complete those contracts due to the recent interruption of their work, would be financed by A.I.D. Those contractors would be made subject to the supervision and coordination of the Prime Contractor. Any appeals to be made by those contractors concerning actions or decisions of the Prime Contractor would be registered directly with the A.I.D. Office of the Project Manager.

4) The G.O.G. will proceed immediately to obtain title to all land, easements and rights of way required for the construction and operation of the Airport. The G.O.G. legislation enacted to acquire the land will provide that compensation therefore will be made to the owners of the land.

5) All equipment presently in Grenada which had been available for use on the Airport Project before work was interrupted, will be made available to the Prime Contractor, and through the Prime Contractor to other Contractors on the project, for its exclusive use in finishing the project.

6) The G.O.G. will take whatever steps are necessary for the prompt relocation of the Medical Campus at True Blue to provide adequate space for the runway overrun. The G.O.G. will investigate the possibility of the provision and perhaps the relocation of other facilities on the island which might be used by the medical faculty.

7) The G.O.G. will insure that the required access to the project site is provided to the Prime Contractor, along with the necessary work areas to include, but not be limited by, full use of all buildings and yarding areas within the permanent airport boundaries and those areas off site such as the quarry and warehousing locations previously utilized by airport construction organizations.

8) The G.O.G. will take immediate steps to insure that adequate security is provided at essential sites, so that project materials and commodities are safeguarded. This will include security at the airport site and adjoining areas, as well as at the quarry, material warehouses, and places in which asphalt and quarry materials are stored. The primary responsibility for airport construction site and associated warehouses, quarry, etc., security will become the responsibility of the Prime Contractor at the time of his moving onto

the site.

9) In order to allow efficient implementation of the Project, all commercial and unauthorized private air traffic will begin utilization of the Point Saline Airport only at an appropriate time subsequent to the scheduled October 1984 opening of the facility.

10) The G.O.G. will reach a prompt decision, prior to the advent of project construction, on the manner of completion and operation of the Fuel Farm and related Terminal Facilities in the vicinity of the Airport. Especially important is the extent to which a Project Contractor will have responsibility for the construction activities.

11) The G.O.G. will make a prompt application to the European Economic Community to reinstate the credit to be used to finance the G.O.G. aviation program.

12) The G.O.G. will insure that minutes are kept for all meetings of the Project Oversight Committee, as well as for meetings to review the progress of the Airport Project and of meetings with Donor Agencies regarding the Airport.

13) All desired design changes to the original airport plans and specifications will be agreed upon by the G.O.G., other donors as appropriate, and A.I.D. They shall include, but not be limited to, elimination of the I.L.S. system and the V.I.P. lounge; inclusion of a D.V.O.R./D.M.E. system, and desired alterations to the Terminal Building.

Government of the United States

Government of Grenada

ATTACHMENT A

TYPE EXPENSE		TOTAL (1)
		(US.$)
PERSONNEL	No.	
Airport Manager	1	8,470
Deputy/Opns Officer	1	7,610
Air Traffic Control	6	29,550
Air Traffic Control	6	23,690
Air Information Service/Meterology	6	23,690
Maintenance of Navigation/Comms.	8	39,400
Electrical		
Chief	1	5,600
Electrician	4	14,460
Structures and Grounds		
Chief	1	3,730
Equipment operator	1	2,610
Carpenter	1	2,690
Painter	1	2,690
Mechanic	2	5,370
Truck Driver	1	2,240
Plumber	2	5,370
Laborer	4	5,970
Supply	2	3,580
Janitorial		
Chief	1	2,610
Janitor	8	12,540
Fire & rescue		
Chief	1	4,100
Firemen	12	26,870
Security		
Chief	1	4,100
Passenger	6	11,200
Other (2)	8	12,540
Administration (3)		
Secretary	1	2,990
Clerk	2	3,730
Switchboard	4	6,720
Sub-total personnel	92	274,120

ATTACHMENT B

FUTURE OPERATING COST ESTIMATE - POINT SALINES AIRPORT

	Personnel Increases		Other Increases		
Year	Amount	No. and Type	Amount	% of 1985 level	Total
(a)	(b)	(c)	(d)	(e)	(f)
1985	274,120	(Base Year)	108,030	-	458,580
1990	15,860	4 - Fire and Rescue 2 - Janitorial 2 - Passenger Security	15,860	15	496,670
1995	17,200	2 - Controllers 1 - Plumber 4 - Laborers 2 - Janitors 1 - Switchboard / PA 2 - Passenger Security	30,700	28	554,170
2000	32,240	1 - Plumber 2 - Laborers 3 - Janitors 4 - Maint. of Nav./Com. 2 - Clerks	41,680	39	642,900

(1) Columns (b) and (d) will not add to columns (f), since the latter contains a 20% allowance for each year.

(2) Composition of 1985 cost shown by Table 7.3 considered as base year.

Chapter IV

Project Management

A. Monitoring Plan

USAID/Grenada has overall responsibility for monitoring this project. To carry out this function USAID will have a Project Management Team to be stationed at the airport to supervise the work being done, to take action on requests made by the design-construct contractor, to assist the Government of Grenada respond to U.S.-required documentary approvals and any other actions needed to put the airport into operation, as planned, by October, 1984 and to complete the airport by December, 1985. To assist USAID/Grenada and the Project Management Team such additional skills as required may be deployed through RDO/C and/or AID/W. Until such time as the Project Manager is stationed on Grenada, the monitoring function will be carried out by the special Point Saline International Airport Task Force and USAID/Grenada. Annex H contains a schematic of the relationships involved.

B. Evaluation

Completion of the airport at Point Saline should make an interesting study on the effect of a large, modern air facility on the economy of a small Caribbean island. Admittedly, Grenada is a special case. Because of the rescue mission, the island has received a major windfall in the nature of enormous

publicity and global attention. If the Government and the tourist industry advertise the availability of single airline/save day service flights (the airport itself is a tourist attraction) and package tours, one would expect the response to be substantial. However, despite Grenada's unique situation, the lessons to be learned at Point Saline should prove of value.

Baseline data will be gathered in October (the date the airport becomes operational). Such data should include the normal economic indications (GDP, per capita income, foreign exchange accounts, etc.) as well as data relative to the tourist industry (number of tourists, numbers and types of accomodations, average monies spent on the island, etc.). A comparison can then be made three years later of the effect of the airport, using the same data, adjusted for normal growth. USAID will be responsible for seeing that baseline data is gathered in October, 1984 and USAID or RDO/C will be responsible for the effort three years later. Funds for these efforts should be charged to this project.

POINT SALINES INTERNATIONAL AIRPORT, GRENADA — CONSTRUCTION COMPLETION PROJECT

$19.0 million Cost to U.S.
100,000 population - Beneficiaries (
16 months Duration
December 1985 Completion Date

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
GOAL Contribute to Grenadian national economic growth in the following sectors:- 1. TOURISM 2. EXPORTS & Reduce UNEMPLOYMENT	Base 1984 / 1985 / 1990 / 1995 / 200 1.a. Tourists (000's) — 2 / 15 / 40 / 5 b. Tourist Days (000's) — 18 / 134 / 358 / 44 c. Tourist Expenditures ($000's) — 1 / 7 / 18 / 2 2.a. Clothing ($millions) — 2 b. All other (Agric. etc)($mill) — 16 3.a. Unemployment (000's) — 13 b. Unemployment Rate (%) — 33	Government of Grenada National Income Accounting Information & Service Statistics System Employment & Unemployment Surveys Private Enterprise Small Business Development and Marketing Surveys	1. Stable GOG political climate which encourages private inves in the tourist industry, and provides incentives to commerc export enterprises. 2. Tourists will be attracted to Grenada in sufficient numbers warrant the expanded investment. 3. World demand for Grenadian exports is sufficiently high to warrant expanded production. 4. Commercial Airlines find it profitable to establish regularl scheduled tourist and freight flights to/from Grenada.
PURPOSE To improve Grenadian access to business opportunities in tourism and exports	End-of-Project Status 1. Point Salines Airport open to unrestricted operations. 2. 11,000 aircraft operations per year being handled by December 1985.	Day & Night IFR Certification by ICAO/ ECDCAA	1. Air Travel/Freight rates, timing and frequency are competit with ships for access to intended markets. 2. Neighboring Caribbean countries are willing to share curren markets and tourist traffic with Grenada. 3. Hotel & Restaurant facilities expanded to accomodate increas
SUB-PURPOSE To open Point Salines Airport to internation-al commercial jet aircraft, for limited day operations during the 1984-85 tourist season.	1. Runway completed for large commercial jet aircraft. 2. Temporary facilities constructed, equipment installed and staff in place to perform necessary services. 3. Inaugural Commercial Flight, 25 October 1984.	VFR Certification by ICAO/ECDCAA.	1. Airlines can Charter and/or Schedule regular recurring fligh and advertise sufficiently to meet 1984-85 tourist season. 2. Airlines & Hotels bookings at, or above Break-Even Threshhol 3. Continued construction-to-completion will not adversely aff flight scheduling and tourist use of airport during 1984-85
OUTPUTS 1. Construction of Airport Runway, Taxiway, Access Roads, Buildings; Equipment, Facilities and Services installed and/or on-hand. 2. Grenadian Personnel Trained to operate all airport facilities and services; initially with ex-patriate help, but ultimately (by EOPS) independently. 3. Government of Grenada (GOG) Information & Service Statistics System established to survey, record and monitor data for base-line and subsequent evaluation purposes.	1. Acceptance by GOG & AID Project Manager. 2. 3. Acceptance by GOG & AID Project Manager. 4. Baseline Survey completed.	Project documentation progress reports.	1.a. Favorable weather for construction activities. b. Coordination with Other Donor activities will not unduly dela project construction activities. 2. Sufficient Grenadian personnel can be recruited and trained to operate airport upon completion of AID construction activ 3. GOG staff (and/or consultant) budgeted to perform this activ and subsequent evaluations as necessary, high priority.
INPUTS AID (Personnel, Equipment, Training & $) GOG (Operating & Maintenance Costs) Other Donors: Canada United Kingdom EEC Others	$19 million Grant 1984 & 1985 ESF Funds $7.5 million budget 1985 - 2000 C$8.6 million ~~£1.75 million~~ ECU million To be determined	Project Documentation Reports of AID, GOG & Other Donors	1. Legal impediments to airport land ownership issue resolved. 2. Organizational entity to administer project with full GOG authority approved, established and staffed.

Annex B

Economic Analysis

Introduction

The following economic analysis utilizes the data collected by Wilbur Smith and Associates (the consultant) for use in the economic analysis portion of the Grenada airport study performed under contract to AID. While the methodology employed here in the Project Paper is similar to the consultant's, and use his data, several important changes or additions have been made. These alterations provide a clearer and tighter methodological approach with the conclusion that the airport is an economically viable project.

Background

While other purposes are identified for justifying the building of the airport, the major purpose is to stimulate the tourist trade. In other words, it is a tourist project. The project is an unusual one in that it represents a large, lumpy, indivisible investment that creates benefits external to the main tourist objective.

To properly analyze a tourist project such as this, the analyst needs to determine if additional supporting infrastructure changes will be needed to complement that airport and what their costs, if any, will be. If there is a new airport, but inadequate roads, poor communications, and inadequate electricity, water, sewage, publicity, etc., it would be difficult, if not impossible, to claim that the airport alone will attract additional tourist, or to specify how many would be attracted without the usual complementary infrastructure improvements. Once the infrastructure items are identified and costed, the analyst then must estimate the touist benefits that will result from this complete tourist project package and the non-tourist related benefits that will accure to the other sectors of the economy as a result of the improved individual infrastructure items.

Estimating these costs and benefits is difficult and time consuming. When time becomes a constraint, a possible alterative methodology is that which would only consider airport costs and which allows the analyst to use the "reasonable-person-could-conclude" approach to demonstrate, if not prove, feasibility. This is the approach developed by the contractor.

In the following sections we describe in some detail the approach used by the contractor, noting its shortcomings. We then present step-by-step adjustments to the consultant's original work in order to develop a more classical benefit/cost analysis than that presented by the contractor, thereby making

the analysis more explicit and precise and thus clearer to the reader. The result is a more defensible and tighter analytical approach, so that, regardless of the outcome of the analysis, we have more confidence in the results than that originally produced by the contractor.

Summary of Consultant's Analysis

Estimation of Benefits and Costs

The consultant estimates that additional tourist days, and hence increased tourist expenditures, will provide practically all the additional benefits resulting from the airport improvement (about 90%). Other additional benefits included area landing fees, airport rentals, vehicle operating costs (taxis will travel fewer miles) and some induced employment in agriculture and industry as a result of the better air service.

True with and without analysis is applied to obtain the number of tourists anticipated as a result of the improved airport: in 1985 the consultant estimates that 2,000 more tourists will visit Grenada as a result of the improved airport, or 7% more than would occur if the old airport were used; by 1990, the extra number of tourists per year grows to 15,000, or 35% greater than the without or old airport situation; by 1995 the percentage increase rises to 100% with 40,000 additional tourists expected annually over what would be expected to occur if the old airport were still in use; the 100% increase maintains itself thereafter with the maximum absolute annual difference being reached in the year 2000 when 50,000 more tourists are expected to arrive as a result of the project.

The consultant assumes that the average tourist expenditure will be an admittedly conservative $50/day and that the average stay will be 8.5 days. An additional calculation is made to capture the extra income that will accrue to Grenada as a result of there no longer being a need to overnight in Barbados before flying into Grenada -- point 2 in the benefit calculations on page 15.

Similar calculations are made for the other benefit categories. The calculations for all the benefits can be found on pages 15-18.

The source with and without analysis applied to the benefits is also applied to the airport costs in order to arrive at the extra capital and operating costs created by the new airport. See page 19 for the annual additional costs.

Methodology and Results

The consultant recognizes that the estimated increase in tourists discussed earlier are dependent not only on the airport's completion but also on the improvement in the overall social infrastructure, including such items as roads, water,

sewage, electricity and communications -- not to mention additional hotel rooms. However, no attempt is made at estimating these costs figures and incorporating them into the traditional B/C analysis that would include not only the airport costs and the benefits discussed earlier, but also the production cost data for the various tourist-related service activities, and an estimation of the additional benefits that accrue to the rest of the economy as a result of the improved infrstructure.

As an alternative approach the consultant asked the question, "How much of the additional tourist expenditure (benefits) must be said to result from the airport expenditure (costs) in order to produce a B/C ratio of 1 at 5, 10, and 12% discount rates?" Based on the above approach, the analysis determined that 12, 24, and 32% of the $50 would have to be ascribed to the airport construction to produce a B/C ration of 1 at 5, 10 and 12% discount rates respectively. Implicit in this approach is the belief that, once these percentages of the tourist expenditure are calculated, an expert in the field can reasonably conclude that the project is feasible. And, in fact, that is precisely what the consultant did immediately following the sentence containing the 12, 24 and 32% figures: On page 6-23 the report states, "It is, therefore, apparent that ... the project is feasible."

Unfortunately, the consultant does not explain why feasibility is so readily apparent to him. Without some other information, such as an estimate, regardless of how preliminary it may be, of the extra infrastructure costs required to complement the airport costs, we have no benchmark against which we can determine how reasonable the consultant's conclusion is. He does not explain why ascribing as high as 32% of the benefits to cover the airport costs allows him to conclude that the remaining 68% of $50 is sufficient to cover the other costs and still produce a B/C ratio of 1 at a 12% discount rate. He does state at one point that the $50 expenditure per day is extremely conservative, implying that the 32% figure needed to cover the airport costs and still give a B/C of 1 would fall to 16% and that the remaining 84% of benefits surely would cover all the other necessary complementary infrastructure improvements. Intuitively, that low 16% figure is quite attractive, implying a rather wide margin to cover the other unknown costs. Nevertheless, the magnitude of these costs remain unknown, and the contractor's analysis still suffers from its original shortcoming.

D. Adjustments to the Consultant's Approach

1. Placing the Consultant's Method in the Classical B/C Equation Format

Although the contractor does not carry his analysis beyond the point described above, it is obvious that he, however informally and implicitly, must have carried out the following type of analysis in order to conclude that the project will render a rate of return of 12%, and that pressures of time and resources led to the failure to include such an analysis in his report.

The procedure used by the contractor to determine the percentage of tourist benefits needed to produce a B/C ratio of 1 at 5, 10, and 12% discount rates, when just the airport costs are considered, can be expressed by the following B/C equation:

$$(1)\quad B/C = \frac{X\ (\text{P.V. of net change in tourist expenditure})}{(\text{P.V. of net change in airport costs})} = 1$$

where: X 1

P.V. of net change in airport costs	=	Present value of both the extra capital and operating airport expenses for the years 1984-2014
P.V. of net change in tourist expend.	=	Present value of the expenditures of the additional tourists who spend on the average $50/day for 8.5 days for the years 1984-2014.
Discount factor	=	Three different discount factors are used: 5, 10, and 12%.

Note: When the B/C equation is set equal to one for the purpose of solving for an unknown in the equation, the discount factor used is equivalent to the internal rate of return.

Solving equation (1) for X:

$$(2)\quad X = \frac{\text{P.V. of net change in airport costs}}{\text{P.V. of net change in tourist expend.}}$$

= 32% (at a 12% discount rate)

= 24% (at a 10% discount rate)

= 12% (at a 5% discount rate)

2. Using the B/C equation to solve for the other infrastructure costs

With a few changes in the above B/C equation, we can solve for the other infrastructure costs implied in the consultant's analysis. We include all the tourist benefits in the numerator (i.e. we eliminate the X from the numerator). The new equation would, thus, take the general form:

$$(3)\quad B/C = \frac{\text{P.V. of net change in tourist revenue}}{(\text{P.V. Infra Costs}) + (\text{P.V. Airport Costs})}$$

Taking the appropriate revenue and cost figures from pages 18-19 and applying the appropriate discount factor values derived on the same pages, equation (3) takes the more specific form:

$$(3A)\quad B/C = \frac{(W)(SDF) + X(SDF) + Y(SDF) + Z(SDF)}{(\text{Infra Costs})(SDF) + \text{P.V. Airport Costs}}$$

where:

W,X,Y,Z = Average annual change in total benefits or tourist revenue for the 1985-89, 1990-1994, 1995-200, 2000-2014 periods, respectively. See page __.

SDF = the sum of discount factors (for a given discountrate) for the years in each period. Year 1 is assumed to be 1984: thus, SDF for 1985-89 at a 12% discount factor is .797 + .711 + .635 + .567 + .506 = 3.22.

Infra Costs = The other infrastructure costs are assumed to occur in 1985, 1989, 1994, and 1999. For ease of presentation we assume the same nominal expenditure occurs in each of the four years. While we could have spread these expenditures over any number of years, we decided to tie them to the large jumps in tourism that occur in our model in 1985, 1990, 1995, 2000.

SDF = Assuming the same nominal Infra Costs for each of the four years, we can sum the four discount factors into a constant for a given discount rate. See page 18.

Airport Costs = See page 19 for the present value calculation.

Shadow Prices = In all B/C calculations that follow, we assume appropriate shadow pricing has been performed.

With the above explanation we can now solve for the other costs assuming a 12% discount rate: See pages 15-19 for the data.

$$(4)\quad B/C = \frac{(\$4.1)(3.22)+(\$12.7)(1.82)+(\$20.7)(1.03)+\$2.0)(1.11)}{(\text{Infra cost})(1.75) + \$25.5 \text{ Airport Costs}}$$

$$\frac{\$83}{(\text{Infra cost})(1.75) + \$25.5 \text{ Airport Costs}}$$

where: The $ figures are in millions
$25.5.is the p.v. airport costs (see page 19)
Discount rate = 12%

Setting equation (4) equal to 1 and solving for Infra Costs:

(5) (Infra Costs)(1.75) = $83 - $25.5
= $57.50 (total p.v. in 1985)

Infra Costs = $\frac{\$57.50}{1.75}$

= $33 million (nominal expenditure in each of the years 1985, 1989, 1994, and 1999.)

Equation (5) states that for the B/C ratio to be equal to 1 at a 12% discount rate, the present value of the "infra costs" cannot exceed $57.5 million in 1985; or in nominal terms, that the expenditures in each of the four years (1985, 1989, 1994, 1999) cannot exceed $33 million. Recall that when the B/C equation is set equal to one, the discount rate used is equivalent to the internal rate of return.

Equation 5 places us in a much stronger analytical position to arrive at the same conclusion that the consultant reached from a more intuitive approach. For, we now have a benchmark figure that we can use in establishing reasonableness. Discussions with engineers familiar with Grenada indicate that improvements in the infrastructure needed to complement the airport range between $10 and $15 million, far short of the $57.5 million figure in equation (5).

On the basis of the above analysis, it would appear that we could safely conclude that the project not only will provide an internal rate of return of 12%, but that in fact it will exceed 12% by some healthy margin. However, before we can safely reach that conclusion, we need to determine whether the benefit figures used by the consultant represent a change in net or gross revenue or benefits to the economy. In the following section we explore the significance of this distinction between net and gross revenue changes and the impact on the rate of return for the project.

3. Using the with- and without-project approach to demonstrate the understatement of tourist activity costs

Up to this point our adjustments have been more of a clarifying, rather than a substantive nature. In the previous adjustments we have accepted the consultant's benefit calculations without question in order to deal with the process of arriving at a stronger "reasonableness" conclusion regarding the feasibility of the project. As stated earlier if we stopped at this juncture we could state categorically that the project provides a rate of return well in excess of 12%, and if we were so inclined, could actually calculate the specific IRR.

Unfortunately, we must consider the manner in which the benefits were used. By benefits we will confine the discussion to the tourist benefits since they represent 90% of all the benefits. See page 18. Nevertheless the same argument will apply to the other benefits.

The consultant's use of the $50/day figure implies that it all stays in the country as value added--that there is no leakage. Or, at best, it implies that the multiplier effect will lead to an increase in value added to the economy of $50. Both are questionable and not substantiated. In terms of traditional B/C analysis, the consultant uses the $50/day figure as if it represented the change in net revenue or benefits, whereas it actually represents the change in total revenue or benefits: a whole set of costs have been ignored that need to be included. To clarify this point the following example is provided.

In traditional B/C analysis the with- and without-project approach is taken in order to obtain the changes in total revenue and changes in total costs that result from a project. In our case here, we would consider the various tourist businesses or activities; estimating the revenues and costs for each on the assumption that the project did not exist (the without-project situation) and estimating the presumably larger revenues and probably higher costs on the assumption that the project exists (the with-project situation). Subtracting the without from the with situation gives the change in total revenue and change in total cost figures for the numerator and denominator respectively. If we assume no other benefits, we then have to place the infrastructure and airport costs in the denominator. The B/C equation would take the following form:

$$(6)\quad B/C = \frac{TR1 - TR0}{(TC1-TC0) + d\ \text{Infra Costs} + d\ \text{Airport Costs}}$$

$$(6A)\quad B/C = \frac{dTR}{dTC + d\ \text{Infra Costs} + d\ \text{Airport Costs}}$$

Where:

TR1, TR0 = Total revenue from the tourist activities grouped as one for expository purposes in the with- (TR1) and the without (TR0) project situations.

dTR = TR1 - TR0 = change in Total Revenue

TC1, TC0 = Total cost from tourist activities in the with- (TC1) and the without- (TC0) project situations.

dTC = TC1 - TC0 = change in Total Cost

d Infra Cost = Assumed to be net change (based on with- and without-project approach) in order not to detract from the tourist revenue issue.

d Airport Costs = Net change, see page 19.

Note: All values are assumed to be discounted present values, each depending on the discount rate chosen.

If we accept the argument that the $50 represents a total revenue change, then a comparison of equations (3) and (6) indicates clearly that our calculation in equation (3) is missing the cost element "dTC" and, therefore, that we cannot use equation (3) to arrive at a conclusion regarding the rate of return of the project. We need to be able to separate out the costs associated with the tourism activities from those associated with the infrastructure costs as shown in equation (6).

Earlier in this section we said that the consultant used the $50 as a net change in revenue figure. To see how the traditional B/C equation can be manipulated to give us a net change in revenue figure, we set equation (6A) equal to 1 and rearrange:

(7) dTC + d Infra Costs + d Airport Costs = dTR

(7A) d Infra Costs + d Airport Costs = dTR - dTC

= dNR

Where: dNR = change in Net Revenue

Rearranging once again:

$$(8)\quad B/C = \frac{dNR}{d\text{ Infra Costs} + d\text{ Airport Costs}}$$

It is equation (8), less the Infra Costs, that the consultant used with the implicit assumption that the $50 figure was a net revenue rather than a total revenue figure. We will use equation (6) in a slightly different form in the next section in order to get us to the final step where we can come to some strong conclusions regarding the rate of return for the project and overcome the problems created by the consultant's assumptions..

4. Recalculating the Rate of Return Based on the Adjusted B/C Equation

At this point we are faced with two unknowns, the other infrastructure costs and the extra total costs associated with the tourist activities. We must estimate one variable and solve for the other. While we have a choice, in keeping with the earlier approaches, we have chosen to estimate the extra total costs associated with the tourist activities and solve for the other infrastructure costs. While it obviously is difficult to know with precision, without some further information-gathering and analysis, an average of 15% return on sales would seem a conservative estimate for the tourist activities as a group. In our example, this implies that total cost is 85% of total revenue. We assume the same percentage applies to the change in total revenue (dTR) and change in total cost (dTC) in equation (6), i.e., dTC = .85dTR.

Substituting the value, (.85) (dTR), into equation (6) allows the following simplifications to occur.

$$(9)\quad B/C = \frac{dTR}{(.85)(dTR) + d\text{ Infra Costs} + d\text{ Airport Costs}}$$

Setting equation (9) equal to one allows us to consolidate the two revenue variables:

$$(10)\quad d\text{ Infra Costs} + d\text{ Airport Costs} = dTR - (.85)\,dTR$$

$$= (.15)\,dTR$$

Carrying the rearranging one more step allows us to return to our original B/C equation:

$$(11)\quad B/C = \frac{(.15)\ dTR}{d\ \text{Infra Costs} + d\ \text{Airport Costs}}$$

A comparison of equations (6) and (9) and (11) reveals the three adjustments we have made in the original analysis.

In the following calculation we set the discount rate at 5%, and solve equation (11) for the infrastructure costs as we did in equations (4) and (5). The discount factors can be found on page 18. The new present value calculation for airport costs is found on page 19.

$$(12)\quad B/C = \frac{(.15)[(\$4.1)(4.12)+(\$12.7)(3.23)+(\$20.7)(2.53)+(\$23)(4.76)]}{(d\ \text{Infra Costs})(2.7) + \$31.8\ \text{Airport Costs}}$$

$$= \frac{(.15)(\$220)}{(d\ \text{Infra Costs})(2.7) + \$31.8\ \text{Airport Costs}}$$

Setting the above equal to 1 and rearranging:

$$(13)\quad (d\ \text{Infra Costs})(2.7) = (.15)(\$220) - \$31.8$$

$$= \$1.2\ \text{million}$$

$$d\ \text{Infra Costs} = \frac{1.2\ \text{million}}{2.7}$$

$$= \$444,444$$

From the above results we would be compelled to conclude that the project probably will not render at least a 5% rate of return because, if our assumption of the 85% relationship between tourist revenue and costs is anywhere near correct, the amount that can be spent for the supporting infrastructure elements is extremely low, totaling only $1.2 million in present value terms or a nominal expenditure of $444,000 in each of the four years set in the model -- figures well below the $10-$15 million figure suggested by various engineers. Preliminary estimates for the road improvement alone is $2 million.

Though we have obtained a result, using what we believe is a more thorough and correct analysis than that applied by the consultant, which would seem to imply that the project will not provide a rate of return normally considered a minimum necessary for a project's acceptance, there is an important

sensitivity analysis exercise concerning the $50 daily tourist expenditure assumption, used by the consultant and adopted in all of our analysis until now, that we need to pursue.

5. Sensititity Analysis

The $50 daily transit expenditure was derived from historical data by the consultant, although more recent data indicated that the expenditure was at least $100 and would be that high or higher in the future. Nevertheless he used the $50 figure in order to be able to emphasize, if the project proved feasible with the $50 assumption, the extreme conservative benefit estimates. When the project proved feasible, at the $50 level, the consultant felt no need to use the $100 figure -- it was only necessary to refer to it and argue that the calculated returns were really higher than those being shown because they were based on the lower $50 figure.

However, if we now include the more realistic $100 figure in our analysis, equation (12), which is based on a 5% discount rate, would become:

(14) $B/C = 1 =$

$$\frac{(.15)[(\$7.9)(4.12)+(\$25.0)(3.23)+(\$40.9)(2.53)+(\$45.4)(4.76)]}{(\text{d Infra Costs})(2.7) + \$31.8 \text{ Airport Costs}}$$

$$= \frac{(.156)(\$432.9)}{(\text{d Infra Cost})(2.7) + \$31.8 \text{ Airport Cost}}$$

Solving equation (14) for d Infra Costs:

(15) $(\text{d Infra Costs})(2.7) = (.15)(\$432.9) - \$31.8$

$= \$65 - \$31.8$

$= \$33.2$

$\text{d Infra Costs} = \$12$

From the high infrastructure costs that this set of assumptions allows, we now can say unequivocably that we are convinced that the project will produce a rate of return in excess of 5%.

If we change the discount factor to 10% (see pages 18-19 for figures) but otherwise continue with the same set of assumptions, we will obtain:

(16) $B/C = 1 =$

$$\frac{(.15)[(\$7.9)(3.44)+(\$25)(2.14)+(\$40.9(1.33)+(\$45.4)(1.66)]}{(\text{d Infra Costs})(1.96)+\$26.9 \text{ Airport Costs}}$$

$$\frac{(.15)(\$210)}{(\text{d Infra costs})(1.96) + \$26.9}$$

Solving for d Infra Costs:

(17) $(\text{d Infra Costs})(1.96) = (.15)(\$210) - \$26.9$

$= \$4.6$

d Infra costs $= \$2.35$

From our previous discussion, these infrastructure costs would not be sufficient to provide the complementary infrastructure improvements needed to attract the additional tourists. Thus under our present set of cost and revenue assumptions, the project will not render a rate of return as high as 10%.

At this point it is relevant to examine the sensitivity of our results to the assumption of the relationship between total tourist activity costs and revenues. If we assume that the change in total tourist costs is only 75% of the change in total tourist revenue, equation (17) would read:

(18) $(\text{d Infra Costs})(1.96) = (.25)(\$210) - \$26.9$

$= \$25.6$

d Infra Costs $= \$13$

Now, these infrastructure figures fall within the range we earlier estimated as probable. Thus, if the tourist cost is 75% or less of tourist revenue, all other assumptions constant, the project would produce a rate of return of at least 10%.

There is one last benefit consideration before finishing the analysis. While all projects create indirect or even direct benefits beyond the group directly affected, an infrastructure project of this nature and size plays a key role in the development of the entire economy. Thus, while it may not be appropriate, because of the estimation difficulties involved, to consider the multiplier effect of most projects as their impacts ripple through an economy, that is not the case here. Some consideration needs to be given to the direct effects of the complementary infrastructure items in sectors beyond tourism as well as the indirect ones.

The consultant refers to a multiplier of 1.4. However, rather than arbitrarily pick a value and add one more tenuous variable to the already overburdened list, we take the general model we have been using, where dTC = .85dTR (as in equations 14 through 17), the discount rate equals 12%, and the high present value figure for infrastructure costs of $20 million is used.

The adjusted equation now reads:

(19) B/C = 1 =

$$\frac{[(\$7.9)(3.22)+(\$2.5)(1.82)+(\$40.9)(1.03)+(\$45.4)(1.11)]X}{.85[\text{Numerator}] + \$20 + 25.5}$$

Solving for X:

(20) $(\$163.5)X = (.85)(163.5) + 20 + 25.5$

$$X = \frac{184.5}{163.5}$$

$$= 1.1$$

Thus, with a dTC = .85dTR, the multiplier effect need be only 1.1 in order for the project to render a 12% rate of return. With dTC = .75dTR, the 1.1 multiplier would raise the rate of return well above 12%.

E. Summary and Conclusion

We have shown: (1) that the consultant's approach omitted two key cost elements -- the extra costs generated with the extra revenue from the additional tourists and the additional costs associated with the infrastructure needed to complement the airport expenditures; and (2) that as a consequence of these omissions it is not possible to conclude, as readily as the consultant implied, that this project is feasible or not at any rate of return figure. We then went on to demonstrate that when these two cost items are included we can state with confidence: (1) that when tourist benefits only are considered, the project will render a rate of return in excess of 5% but probably less than 12%; and (2) that when we include a small multiplier effect of 1.1 in order to account for the non-tourist benefits (in addition to the few already included in the basic model), which certainly will occur as a result of the airport and other infrastructure construction, the project will render a rate of return of 12%. We did not carry out further calculations using the 1.4 multiplier figure used by the Grenadian Government because the obvious consequence would be to raise the rate of return above 12%, which should be an acceptable rate of return for such social infrastructure items.

In equations (14) through (17) we demonstrated the sensitivity of the results to the relationship between extra revenues and costs in the tourist activities. Two other critical variables, of course, are the extra revenue from tourism expressed in dollars per day of expenditure per tourist and the number extra tourists, and the costs of the other infrastructure items. However, the results of the analysis are probably less sensitive to these two items than might be anticipated at first glance. For, there probably is a relationship between increased tourism revenues and the amount spent on the other infrastructure items. Thus, if experience eventually reveals that our estimate of increased tourism revenues was too high due to fewer tourists, we probably will find that the amount spent on the other infrastructure items is less than the critical values we have calculated here, with the result that the rate of return may not change significantly.

Finally, we have been able to demonstrate that, even though we lack some specific data sets, we can arrive at some strong conclusions regarding the feasibility of the project. Based upon this analysis, we are confident that the project will render a rate of return of 12% or larger.

CALCULATIONS

Benefits (Tourists and extra day for 45%)

1.

Year	Tourist Revenue	Tourists	Yearly Avg*	Yrs
1985	$850,000	(2,000 x $50 x 8.5 days)		
			$3,612,500	1985-1989
1990	$6,375,000	(15,000 x $50 x 8.5 days)		
			$11,617,500	1990-1994
1995	$17,000,000	(40,000 x $50 x 8.5 days)		
			$19,125,000	1995-1999
2000	$21,250,000	(50,000 x $50 x 8.5 days)		
			$21,250,000	2000-2014

2. Capturing extra day in Grenada from those who would have stayed in Barbados. (The argument really is that 45% of the tourists stay longer than the 8.5 average.)

Year	Tourist Revenue	Tourist	Yearly Avg	Yrs
1985	$45,000	(2,000 x $50 x .45)		
			$191,250	1985-1988
1990	$337,500	(15,000 x $50 x .45)		
			$618,750	1990-1994
1995	$900,000	(40,000 x $50 x .45)		
			$1,012,500	1995-1998
2000	$1,125,000	(50,000 x $50 x .45)		
			$1,125,000	2000-2014

* For example, for the years 1985-1989 the average is obtained by summing $850,000 and $6,375,000 and dividing by 2. The other averages are obtained in a similar fashion. This avoids the need to estimate the compounded growth rate as done by the consultant. With just 5 year intervals, the average does not significantly change the results. In addition, such a procedure ultimately simplifies the B/C calculation.

3. Other Benefits

a.

Year	Landing Fees	Yearly Avg	Yrs
1985	11,100	23,000	1985 - 1989
1990	34,900	52,650	1990 - 1994
1995	70,400	108,050	1995 - 1999
2000	145,700	145,700	2000 - 2014

b. Airport Rentals

39,200	1985 - 1989	
52,200	1990 - 2014	

c.

Year	Vehicle Operating Costs		
1985	227,200	186,500	1985-1989
1990	145,800	194,500	1990-1994
1995	243,200	261,000	1995-1999
2000	278,800	278,800	2000-2014

d.

Year	Induced employment in agriculture		
1985	61,600	77,000	1985-1989
1990	92,400	108,050	1990-1984
1995	123,200	138,850	1995-1999
2000	154,000	154,000	2000-2014

e.

Year	Induced employment in industry		
1985	13,100	18,110	1985-1989
1990	23,120	27,560	1990-1994
1995	32,000	36,370	1995-1999
2000	40,740	40,740	2000-2014

Sources:

Page 15 — Sections 6.3.5 and 6.3.6, page 6-20 of the Consultant's Report. The service charge and tax were not included in our calculations.

Page 16, 17 — Sections 6.3.1 page 6-16; 6.3.4 page 6-18; 6.3.7 and 6.3.8 page 6-21.

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TOTAL BENEFITS

	1985-1989	1990-1994	1995-1999	2000-2014
Tourists	3,612,500	11,687,500	19,125,000	21,250,000
Extra day Barbados	191,250	618,750	1,012,500	1,125,000
Landing Fees	23,000	52,650	108,050	145,700
Airport Rentals	39,200	52,200	52,200	52,200
Vehicle Oper Costs	186,500	194,500	261,000	278,800
Induced Employment Ag	77,000	108,050	138,850	154,000
Induced Employment In	18,110	27,560	36,370	40,740
Total	4,129,450	12,741,210	20,733,870	23,046,440
SDCFs				
05%	4.12	3.23	2.53	4.76
10%	3.44	2.14	1.33	1.66
12%	3.22	1.82	1.03	1.11
15%	2.91	1.45	.72	.62

Assume all other construction costs occur in 1985, 1989, 1994, 1998, i.e. in 4 separate years. Also assume that the nominal expenditures are identical in each year.

Infrastructure Costs

	Nominal Value		Discount factor at: 5%	10%	12%	PV 5%	PV 10%	PV 12%
1985	X	times	.907	.826	.797			
1989	X	"	.746	.564	.506			
1994	X	"	.584	.350	.287			
1999	X	"	.458	.217	.163			
	Total		2.7	1.96	1.75	X(2.7)	X(1.96)	X(1.75)

* Sum of Discount factors for each of the five year periods. For the 1985-89 period, we can multiply $4.1 by each discount factor, or we can sum the discount factors and then multiply the sum by $4.1 million. We prefer the latter approach.

AIRPORT COSTS

	Costs	Discount factors 5%	10%	12%	Present Values $ PV (5%)	PV (10%)	PV (12%)
1984	24,000,000	.952	.909	.892	22,848,000	21,816,000	21,408,00
1985	187,800	.907	.826	.797	170,335	155,123	149,67
1986	184,500	.863	.751	.711	159,224	138,560	131,18
1987	181,400	.822	.683	.635	149,110	123,896	115,18
1988	178,200	.783	.620	.567	139,531	110,484	101,03
1989	175,100	.746	.564	.506	130,625	98,756	88,60
1990	172,100	.710	.513	.452	122,191	88,287	77,78
1991	175,900	.676	.466	.403	118,908	81,969	70,88
1992	179,700	.644	.424	.360	115,727	76,193	64,69
1993	183,700	.613	.385	.321	112,608	70,725	58,96
1994	187,700	.584	.350	.287	109,617	65,695	53,87
1995	10,791,600	.556	.318	.256	6,000,130	3,431,729	2,007,23
1996	202,400	.530	.289	.229	107,272	58,494	46,35
1997	212,400	.505	.263	.204	107,262	55,861	43,33
1998	222,900	.481	.239	.182	107,215	53,273	40,56
1999	223,900	.458	.217	.163	102,546	48,586	36,49
2000-2014	245,500	4.76	1.66	1.11	1,168,580	407,530	272,50
Tot	37,704,800				31,768,881	26,881,161	25,521,78

Adjusting Total Benefits to Reflect $100/day Tourist Expenditure

1985-89	1990-94	1995-99	2000-20014
4,129,450	12,741,210	20,733,870	23,046,440
3,612,500	11,687,500	19,125,000	21,250,000
191,250	618,750	1,012,500	1,125,000
7,933,200	25,047,460	40,871,370	45,421,400

Source: The Consultant's Report, Appendix B, Table B.7, page B-10.

Annex C

Salines Airport PERT

MARCH -

Week of March 4:

Other Donors: - Canada (CIDA) Repr. meeting Working Group to explore potential for involvement.

Personnel:

- Waiver to hire specialists as PSCs, non-competitively;

- Engineer hired to conduct on-site review and inventory of equipment and airport construction status. Submit Report to LAC/CAR week April 1.

Technical Review: - LAC/CAR Working Group Review and Preliminary Planning.

Week of March 11:

Other Donors:

- Identify other possible donors and the extent of their contribution and involvement (i.e., Great Britain, EEC, Venezuela);

- Canadian Government Review (ottawa);

Technical Review: - Begin on-site review;

Contracting Process:

- Start draft of Project Paper (PP), PIO/T, and Scope of Work from available information;

- Request waivers for Sole Sources Procurement Geog. Code 935 Equipment and Supplies Contracting Method;

Congressional Approval: - Prepare Congressional Notification (CN).

Week of March 18:

Technical Review: - Working Group on-site visit with CIDA rep;

Contracting Process:

- Draft Project Agreement (PROAG);
- Draft Project Paper;
- Draft Request for Proposal;
- Resolve any set-aside issues.

Week of March 25:

Other Donors: - Tentative agreement with CIDA on Work Packages;

Personnel: - Prepare description for Project Manager Position in Grenada;

Contracting Process:

- Equipment specialists on-site to assist Airport Engineer in equipment survey;

- Continue PP review, and approve PP (due week 4/1);

- Continue RFP and mail out to contractors week 4/1.

APRIL -

Week of April 1:

Other Donors:

- Tentative agreement with other donors on Work Packages they would be willing to undertake;

- Review and approval by CIDA.

Contracting Process: - Publish announcement in Commerce Business Daily (CBD) of intent to contract for a Design/ Manage/Build contractor, Bidder's Conference Schedule, and Request for Proposal availability.

GOG Concerns:

- GOG Determination of Disposition of Cuban Equipment;

- Plessey and GOG Status Review; inventory of loss and damage;

- METEX-GOG Contract Status review; inventory of loss and damage;

- GOG resolution of airport land ownership. Issue to AID (U.S. Government). Satisfaction for legal authorization to proceed with construction.

Week of April 1 to April 8:

Contracting Process: Hold 1-day Bidders Conference in AID/W.

Week of April 8:

Congressional Approval: - Congressional Staff Review. AID Presentations as requested.

GOG Concerns:

- AID Opinion (of Plessey-GOG Contract Status Review, inventory of loss and damage);
- AID Opinion (of METEX-GOG Contract Status Review, inventory of loss and damage).

Week of April 15:

Contracting Process - Determine most appropriate method of financing project (i.e., Direct Bank L, Com, etc.);

Funding: Reprogram/obtain PD&S funds for initial phase of contract;

Congressional Approval: - Apportionment OMB-AID;

GOG Concerns:

- Contract renegotiation (Plessey);
- Contract renegotiation (METEX).

Week of April 22:

Personnel: - Research for Project Officer (Contractor or Direct Hire (DH) for assignment to Grenada for duration of project;

Technical Review - Review and negotiate project agreement to Grenada (AID/W);

Congressional Approval:

- Budget Allowance - Project authorization to Grenada (AID/W);

- Congressional Notification hearings, discussion, and approval;

GOG Concerns: - GOG-AID Host Country Contracts and complete Plessey and METEX activities. (due week 5/27);

Other Needs: Advertise prospect for scheduled and non-scheduled (i.e., charter) flights to Grenada and request for proposal (selection process due 5/6).

Week of April 29:

Personnel: - Sign PROAG (AID-GOG);

Contracting Process: - Waiting time to receive proposals from contractors. Results of 1-day Bidder's Conference (held in early April);

Personnel: Solicit assistance from other Bureaus and obtain individuals to be detailed full time as members of Technical Evaluation Panel;

Contracting Process: - Receive funding information (from week 4/15). Prepare documentation.

MAY

Week of May 6:

GOG Concerns: - Training needs assessment for GOG to operate new airport;

Other Needs: - Airline selection process.

Week of May 13:

Contracting Process and Funding:

- Technical evaluation of all proposals and rank ordering;

- Cost evaluation of all proposals in competitive range;

- Determine cash advance requirement. (Approval of FM due by 5/20).

Week of May 20:

Personnel: - Project Officer transfer to USAID/Grenada.

Contracting Process: - Conduct pre-award and audit review.

Funding: - FM approval due (from 5/13);

GOG Concerns: Airline personnel visit Grenada to determine needs.

Week of May 27:

Contracting Process:

- Develop detailed Scope of Work and Funding Approval, and section of Contractor. Other Donors;

- Develop detailed Scope of Work and Funding Approval, and Selection of Contractor - CIDA;

GOG Concerns:

- Conditions Precedent met by GOG;

- Complete all negotiations and obtain Gen Consl clearance;

- GOG-AID Host Country Contracts to continue, and complete Plessey and METEX activities (from 4/22).

JUNE -

Week of June 3:

- Mobilization of Donor Training Team and Equipment;
- Flight routing development and approved (from 5/6);

GOG Concerns:

- Recruitment of Personnel by GOG (from 5/6 and 5/20);
- Start of training of GOG personnel in various skills, as required.

Week of June 10:

Contracting Process: - Contractor advanced crew on site (Proj. Off. already in USAID/Grenada since 5/20). (GOG-AID Host Country Contracts to continue, and complete Plessey and METEX activities (from 4/22). This will carry over to 6/17 activities).

Week of June 17:

Personnel: - Mobilization of contractor (continued from previous weeks, 3/11, 3/25, and 4/1);

Other Donors: - Coordination between GOG, AID, and other donor contractors.

Contracting Process:

- Start up and check out materials and equipment (from 3/10);

- Begin review and redesign of Work Packages and cost estimates;

Other Needs: - Cost Estimate/rate setting (started 6/3).

Between June 17 and June 24: Contractor hires local (Grenada) labor force - skilled, semi-skilled, and unskilled, as needed.

Week of June 24:

- Start rectifying deficiencies (from 6/17);

- Contractor mobilizes crew and moves on-site (from 5/27).

JULY -

Week of July 1:

Contracting Process: - Redesign and cost estimates for Work Packages (continuing from previous weeks);

Technical Concerns: - Flight scheduling (begun 6/17).

FOLLOWING ARE ONGOING ACTIVITIES, INITIATED AT THIS TIME:

Week of July 8:

- Hire labor for airport fencing and security post erection (to carry on to 7/22) (WP 18);

- Finish terminal building and install equipment and fittings for baggage handling and passenger airport services; offices, restaurant/snack bar, and catering for in-flight meal service (Plessey) (WP 19);

- Finish control tower and technical block. Install equipment and fittings. Install navagation aids for ILS-DVOR/DME (Plessey) (WP 20);

- Finish meteorological station and install equipment and fittings (WP 21);

- GOG-AID project officer approval (from 7/1);

- Finish runway wearing course. Asphalting. Work Package. (WP 1);

- Finish central power station (WP 9);

- Finish fire, crash, and rescue station construction (WP 13);

- Finish aircraft hangar (WP 22);

- Finish water storage tank (WP 23);

- Construct incinerator building (WP 24);

Week of July 8 (continued):

- Construct water pipeline and sewage treatment facility (WP 25);

- Complete fuel farm - Phase I - sufficient for airport limited operation (WP 26);

- Construct off-loading facility from ocean tankers to fuel farm (WP 27);

- Begin cross-site telecommunications and electrical work (Plessey) (WP 28);

- Reinforcement of Hardy Bay runway enbankment (south side) and west end of runway (WP 29);

- Removal of hilltop obstructing tower view of runway. Add 200 feet. Fill on east end of runway. Remove and relocate existing "True Blue" medical school buildings and equipment (WP 30);

- Complete aircraft maintenance facilities (WP 31).

1/ WP - Work Project identication reference.

Week of July 22: - Hire local labor for airport fencing and security post erection (from 7/8).

Week of July 29:

- Begin to fabricate fence posts;

- Runway marking (WP 3);

- Finish taxiway asphalting (WP 2);

- Grassing and landscaping runway shoulders, taxiway shoulders, and road shoulders and building surrounds.

AUGUST:

Week of August 5:

- Finish airport ground lighting sub-station (WP 10);

- Equipment, fittings, and vehicles (WP 16).

Week of August 19:

Finish:

- Erect temporary terminal building (WP 14) (started 7/8)

- Hire local labor for airport fencing and security post erection (WP 18) - Finish fabricating fence posts (started 7/8).

Start:

- Install equipment and finish fittings (due 9/16);

- Install post and string fence (due 9/16);

- Taxiway marking (WP 5) (due 9/9);

- Finish apron (WP 4) (due 9/9);

- Install NDB Generation (Plessey) (WP 11) (due 8/26);

- Complete airport ground lighting, runway obstruction, taxiway, apron, car park, and access roads (METEX) (WP 11?).

Week of August 26: - Install non-directional beacon (Plessey) (WP 12) (due 9/9).

SEPTEMBER:

Week of September 2 (Start):

- Recruit and train crews (WP 17);

- Install incinerator and operate.

Week of September 9:

Start:

- Apron marking (WP 7) (due 9/16);

- Begin to finish airport access roads and car park (WP 6). Lead time. (due 9/16);

- Begin testing of non-directional beacon (due 9/16);

Finish:

- Finish installation non-directional beacon (from 8/26) (Plessey) (WP 12).

- Taxiway marking (WP 5) from 8/19);

- Apron (WP 4) (From 8/19).

Week of September 16:

Finish:

- Apron marking (WP 7) (from 9/9);

- Testing of non-directional beacon (from 9/9).

Start: Access road and car park marking and signing (WP 8) (due 10/14).

Week of September 23 (nothing designated).

Week of September 30:

Finish:

- Off-loading facility from ocean tankers to fuel farm (WP 27) (from 7/8);

- Painting and signs (from 9/26);

- Tentative carry-over from 8/19 of installation of posts and string fence;

- Water and storage tank (WP 23) (from 8/8);

- Installation of incinerator and operation of same (from 9/2);

- Finish construction of water pipeline and sewage treatment facility (WP 25) (from 7/8);

- Complete fuel farm - Phase I - sufficient for airport limited operation (WP 26) (from 7/8).

Start:

- Cleanup and landscape (WP 15) (due 10/14);

- Obtain fuel (due 10/7).

OCTOBER:

Week of October 7:

Finish: Obtain fuel (from 9/30);

Start: Complete fuel farm - Phase II - Total complex as designed (due 10/28).

Week of October 14:

Finish:

- Cleanup and landscaping (WP 15) from 9/30);

- ECDCAA-ICAO inspection and acceptance/certification.

Start: - Establish nursery for airport landscaping. (Ongoing).

Week of October 28:

Start: - Final landscaping, painting, signing, and cleanup.

Ongoing (As yet determined time to complete all activities):

- Day and night inspection and certification by ECDCAA-ICOA for unlimited use;

- GOG-AID acceptance;

- Contractor demobilization;

- Contractor closeout;

- AID final payment.

Annex D

EXISTING ENVIRONMENTAL CONDITIONS

A substantial amount of construction work has already been undertaken at the project site. The 9,000 foot long runway has been installed; it requires one additional layer of pavement and a 200 foot overrun extension at its eastern end. The superstructure for the control tower, terminal building, various other buildings, construction camps and maintenance and storage areas are in place. The terminal apron is basically completed. Access and on-site service roads are in various stages of construction. Virtually all of the major earth work including excavation, dredging and filling has already been carried out. This includes large scale fill operations where the runway bisects Hardy Bay and at the west end of the runway at Point Salines and in Black Bay. Details pertaining to the status of construction at the site are presented in the Prefeasibility Study.

Prior to airport construction, the majority of the site was a real estate development with some areas used for grazing of cattle and goats. The grazing continues to some degree in and around the partially completed civil works. The upland areas are relatively dry with occasional prickly pears and cactus varieties found throughout the site. It is apparent that the natural vegetation in the area is all secondary growth which has been cut over or grazed upon. There are a few mangroves, reeds and other salt tolerant vegetation present along the shore of Hardy Bay and around two small salt ponds or marshes which are between the southern edge of the runway and Cato Beach. In general, the terrestrial wildlife habitats in the project area do not appear to be particularly unusual, especially in comparison to other areas in the region.

Along the shore south of the site, clean white sand beaches are found particularly along Grand and Cato Bays. A black sand beach was present on the shoreline of Black Bay, but it was largely eliminated by the filling operations undertaken there. There is evidence that a site of Amerindian remains existed south of the runway near Ship's Deck point; however, this site was apparently destroyed due to excavation carried out here and other areas along the shore by the Cuban construction team. These areas were apparently excavated to provide fill for the runway foundation and the Hardy Bay Crossing.

In general, however, the shoreline remains in relatively good condition with the beaches interspersed with rock outcrops. Just offshore, the water is very clear and shallow from Bagadi Bay westward to Laisse Point. There are relatively extensive coral reefs here, with substantial reef development within one or two miles of the shoreline. Fishing operations are conducted in and around these reefs; the fishermen presently dock their 16 to 20 foot motorized boats in Bagadi Bay. They also use this area to sort and dry the "sea moss" they collect. This "sea moss" (an algae) is sold for preparation of a popular drink. The fisherman also catch red snapper, grouper, etc. for sale to hotels and restaurants. There are 10 to 15 boats which operate out of Bagadi Bay (the fishermen live in Calliste).

Moving further west, the water is naturally deep in Black Bay and around Point Salines. The Point itself was substantially altered by dredge and fill activity. West and north from the site, the shoreline again is characterized by beaches or rock outcrops, and coral reefs are well established.

3.0 IMPACT ANALYSIS

In the following subsections, the major impacts of various components of the airport are identified and analysed. The order of presentation corresponds with the specific requests which were made in the terms of reference for this report. Please note that recommendations for mitigation of environmental safeguards are presented in a separate section following the Impact Analysis.

3.1 Fuel Farm

The fuel farm is partially constructed. Four of the storage tanks have been installed. There are two 500,000 gallon tanks and two 250,000 gallon tanks. No detailed design plans for the fuel farm have been found to date (a number of drawings for various project features were lost during the intervention last October). However, the fuel farm facilities are discussed in both the Master Plan and the Prefeasibility Study. The fuel farm will be supplied by ship via a marine transfer system using a mooring offshore of Magazin Beach and a pipeline from there to the farm. Apparently, a section of the coral reef has already been blasted to permit passage of small tankers to the off-loading points.

The major remaining impact of concern is the possibility of oil spills, either in the conveyance system or at the fuel farm. The fuel farm is located in a small valley which minimizes the chance of damage in the event of a major storm. It is assumed that the tanks have been designed to withstand winds of 100 mph. In addition, the plans indicate that retaining walls will be placed around the tanks and according to the Master Plan, a fuel trap or pool will be present at the coupling of the marine and receiving pipelines to avoid pollution of the beach. While

these are advisable precautions, there is no mention of an oil water separator or any collection or disposal facilities at the fuel farm or at the service area. Also, there is no indication of what precautions are being taken at the mooring point to prevent spills during off-loading. A spill here could be very detrimental considering the sensitive coral reef habitat and nearby beach. Preventive spill facilities should be incorporated into the final design of the fuel farm.

Another possible problem related to the fuel farm is the traffic pattern which will be generated. The present plans may result in the use of the same access road for fuel vehicles as well as passenger and all other traffic to and from the airport. If the fuel farm is intended as a storage supply for other locations outside the airport, there may be a considerable number of fuel trucks using the airport access road. A suggestion has been made to provide separate access for the fuel farm and the airport terminal.

3.2 Obstruction Removals

The overall plan for obstruction removals will be revised shortly; a new review by ICAO will be made of the obstructions. Presently, it is believed that a few buildings in the departure path to the east may have to be removed or appropriately lighted. In addition, there may be a rather extensive excavation needed on a hill which presently prevents a complete view from the control tower of the western approach path. Removal of part of this hill is not considered a significant impact since it is not an unusual land form or habitat. The hill is presently covered with grasses and small bushes; it is probably used intermittently for grazing.

3.3 Embankment Protection: West End of Runway

The embankment fill at the west end of the runway is rapidly eroding away, and this is expected to continue until the original coastline is reached. Part of the lighting installed here will probably be lost. The erosion is also causing a large amount of turbidity in the surrounding water; fortunately there are no reefs immediately adjacent to this shoreline.

Present plans are to place rock facing or other protection here to prevent continued sea erosion. This solution is concurred with since it will eliminate any future problems.

3.4 Armor Protection at Hardy Bay

The southern section of the embankment across Hardy Bay is exposed directly to wave action. Original plans called for a rock armor protection barrier which is about 60% completed. Casual inspection reveals that there is little apparent sea erosion of the facing. However, a coastal engineering study would be needed to confirm this and whether the armor protection should be completed. Completing the barrier would not cause any adverse impacts. It may in fact, be beneficial in preventing erosion of the fill and subsequent siltation and turbidity in Hardy Bay. It left unfinished, erosion is likely to occur due to rains or storm surges from the sea. Since the water is shallow here, it is likely that storm induced wave action would be extensive.

An additional possibility is to complete the armor protection by using it as a disposal area for any excavation which will be needed at the site (i.e., obstruction removal, road cut, etc.).

3.5 Storm Drainage

No drawings are available of the storm drainage system for the site although the Prefeasibility Study indicates that much of the work is completed. Inspection of the site revealed that the drainage system has no provision for contain ng petroleum spills or chemical runoff from maintenance and related operations. Of most concern are:

- leaks and spills from tank trucks and hoses in the apron service areas;
- leaks and spills in hangar and apron area where maintenance and repairs are conducted; and
- accidental spills and rupture of fuel and oil from trucks and aircraft.

If these petroleum wastes are not separated from runoff waters, they will be carried to the coastal receiving waters. This of course would result in a degradation of water quality and a deleterious effect on aquatic life of the inshore waters. Depending upon current movements, oil wastes could reach the coral reefs or accumulate on sand beaches. In any event, it is suggested that appropriate control measures be installed to minimize this impact (see following section).

3.6 Access Roads and Road to Sugar Mill

The airport road to Sugar Mill requires patching and other repairs. This will create no appreciable adverse impacts.

There are two alternatives for access roads to the airport facilities. The northern route passes by the fuel farm and is partially completed. The southern route is more direct without passing the fuel farm. Both roads may in fact be constructed, particularly if the fuel farm will serve other locations beyond the airport. Both proposed corridors would result in taking some private property and a few houses. The GOG in planning to compensate the few landowners who are affected. Neither route would eliminate any exceptional wildlife habitat.

The major effect of road improvement and construction is likely to be the inducement of commercial and other development along the routes. While new developments may be desirable along these roads, they should be carefully planned especially with regard to increased traffic generation, sewage disposal needs, etc. A land use plan is needed for the area surrounding the airport site (see below). This plan would integrate transportation needs for the airport and communities in its vicinity including those along the road corridors.

Completion of the airport, including fencing, could eliminate present access of fisherman to Bagadi Bay. However, consideration is being given to providing a minimum standard access road to this area.

3.7 Sewerage Disposal System

The drawings for the sewerage disposal system are unavailable. The Prefeasibility Study indicates that remote areas of the site will be served by individual septic tanks while the main buildings will be served by a piped collection system which discharges to a treatment lagoon south of the runway. The effluent will be released into Hardy Bay.

In general, the system appears adequate, although there is no provision for the removal of sludge which will accumulate in the lagoon, nor is there any indication of chemical treatment prior to effluent release into Hardy Bay. Without chemical treatment, there is a risk of pathogenic bacteria being released into the coastal waters.

In addition, the location of the lagoon and its outfall appear to arbitrary. The present location would require taking valuable property which the landowner would prefer to retain. Also, it would be preferable to release the effluent in an area which is more conducive to rapid mixing and dilution. Hardy Bay is very shallow and may tend to concentrate the effluent releases there. It is recommended that the treatment system be reviewed and the lagoon and outfall sites be relocated. Specific suggestions are given in the next section.

3.8 Refuse Disposal Facilities

An incinerator will be installed to dispose of solid wastes which presumably would include various petroleum wastes. The Prefeasibility Study mentions that the incinerator will be located near the maintenance area, and it is recommended that the vehicle washing area also be located here with its own septic tank to control the waste waters. Also, the Master Plan does mention that a grease trap will be installed in the maintenance area. All of these above plans are acceptable and should be implemented to limit oil and chemical pollution from the site.

In addition, however, there is no mention of the provision of facilities for the handling and removal of solid wastes which cannot be incinerated. It is uncertain how much this would amount to. In general, a rule-of-thumb

estimate is that about 1.5 pounds of solid waste is generated per enplaned passenger. For the Point Salines Airport, it is estimated that there will be more than 100,000 enplanning passengers by 1990 and 170,000 in 2000. This extrapolates to about 75 and 130 tons, respectively, of waste annually. Undoubtedly, some of this waste can be incinerated, but the remainder plus operation wastes such as fuel containers, etc. will probably have to be disposed in a landfill. It is unknown whether a landfill is available off-site, and presently there is no plan to construct one at the airport.

3.9 Landing and Departure Paths (Noise Impacts)

The compatibility of existing and planned land uses in the vicinity of an airport is usually associated with the extent of noise impacts resulting from that airport, especially in relation to the proposed approach and departure paths. The Master Plan includes a noise analysis of the airport and flight paths. This analysis was based upon the Composite Noise Rating (CNR) method. It was used to predict perceived noise levels quantitatively and to establish two noise zones in the vicinity of the airport and along the flight paths.

The two zones are presented on the accompanying diagram, and the overall results indicate that rather significant noise impacts may occur on nearby land uses. All of the area contained within both of the 100 and 115 CNR contours would not be considered suitable for residential development because of high noise levels. Churches, schools, hospitals and related facilities should also be excluded from these zones. Consequently, a fairly large area including parts of Calliste, True Blue and Lance Aux Epines would be adversely effected. Future development here would be restricted to industrial, commercial, agricultural

and limited recreational uses. Within the 115 CNR zone, only industrial, commercial and agricultural use are compatible' all regularly occupied structure here would need sound protection.

The accuracy of the CNR method is somewhat questionable. The CNR method is relatively outdated and was phased out in the early 1960's by the FAA. While the CNR method provides an indication of noise impacts, the newer methodologies are more accurate and provide better information for planning purposes. Additionally, the data upon which the CNR valves were calculated are unknown. This is specially important with respect to the aircraft mix. The later model planes are quieter and including them in the calculations could reduce the CNR levels. In any event, it is recommended that an updated noise analysis be conducted using the currently accepted Noise Exposure Forecast (NEF) method or the Weighted Equivalent Continuous Perceived Noise Level (WECPNL) method. The results of this analysis can be directly inputted to a land use plan for the airport's surrounding area. Both the NEF and the WECPNL provide more noise zones than the CNR method which facilitates the establishment of compatible land uses.

3.10 Overrun: Runway East End

The eastern end of the runway must be extended about 200 feet in order to provide an acceptable overrun area. This will require a considerable fill operation. Most of this area has already been graded over and thus there would be no loss of any unusual terrestrial habitat. However, this extension will result in the removal of several buildings presently used by the St. George's Medical School. These buildings would in any event be subjected to relatively high noise levels since they are so close to the airport. Presently, alternate sites are being investigated by the GOG

for relocating this portion of the school's infrastructural requirements. The future use of the few buildings which remain after the school vacates them is uncertain.

3.11 Rescue Boat Facilities

Presently, it is proposed that rescue boat facilities including a ramp, buildings, etc, be located somewhere in Hardy Bay. Again, this Bay is relatively shallow and further construction here would undoubtedly result in siltation of the inshore habitats. In addition, although the main rescue boat has a shallow draft, use of any other vessels to support an emergency effort or for other reasons would probably necessitate some dredging in the Bay. This would result in further adverse effects on the aquatic habitat.

Also, use of a Hardy Bay site may require the purchase of high value land which the owner prefers to keep. Finally, the use of the Hardy Bay site does not allow very rapid access to Canoe Bay and other areas on the northern shore. It is recommended that consideration be given to utilizing a site on Black Bay for the rescue boat facilities. This area has already been disturbed by filling operations and has sites which will be within the airport property. Black Bay is a sheltered harbor and is deep enough to obviate the need for any dredging. Also, location here enables rapid access to both the north and south coastlines.

3.12 Soil Erosion

Although a large amount of the construction,especially earthwork, is finished, there will still be some considerable excavation and filling. This will include road cuts and fills, hill obstruction removal, the overrun extension, etc. All of these activities will be vulnerable to soil erosion

during construction. All practical measures should be taken to minimize erosion at the site, particularly since the eroded soil may reach sensitive coral reef or beach areas which are very close to the project works.

3.13 Bird Hazards

The section of Hardy Bay which was isolated by the runway crossing and the two salt ponds south of the runway are potentially excellent habitats for waterfowl. The "isolated" Hardy Bay may begin to gradually fill as runoff sediments accumulate there. Subsequently vegetation may increase in this water body resulting in an increase in biological production and since it is well protected, it could become an attractive nesting or feeding ground for various bird species. A large number of birds residing immediately adjacent to the runway could create a hazard, particularly to smaller aircraft. It is unnecessary to take any preventative steps at this time. However, if the bird population increases substantially in the future, there are various measures which can be taken to eliminate the hazard.

3.14 Air Quality

Some degree of atmospheric contamination due to airport operations is unavoidable. Emissions from aircraft ground vehicles, the incinerator and possible other sources will all contribute to air pollution in the vicinity of the airport. The airport will be an indirect source of air pollution since attracts increased vehicular traffic on the access roads to the terminal.

The undesirable by-products of combustion which are generated by aircraft engines are carbon monoxide, unburnt hydrocarbons, oxides of nitrogen and minute solid particles.

It is primarily the minute solid particles in the air which create the visible evidence of air pollution in the form of smoke plumes; however, these particles, although visually disagreeable, are considered less harmful to public health than the other engine emissions.

In any event, most studies of air quality at airports have revealed that atmospheric pollution in these areas is primarily attributable to automobiles, trucks and other sources. Furthermore, in metropolitan areas, airports often contribute less than one percent of the region's air pollutants. Also, by 1990, the amount of emissions from jet engines are expected to be reduced considerably.

Finally, the proposed airport is located in an area which is continually exposed to full circulation of air currents. Taking all of the above into consideration, and that a relatively low level of air traffic is expected, it is unlikely that the airport will cause significant atmospheric pollution. Undertaking a detailed study of air quality, including dispersion modeling, etc. at the site is considered unnecessary.

3.15 Endangered Species

The most recent U.S. Department of Interior Endangered Species Act Amendments include three bird species which are considered to be endangered (under a threat of extinction) on Grenada. These are:

- Euler's Flycather - *Empidonas culeri johstonei*
- Grenada Hook-billed Kite - *Chondroheirax uncinatus mirus*
- Grenada Dove - *Leptotila wellsi*

These three species are probably endemic to the island, that is, they occur only on Grenada and no where else in the world.

Other species which are also classified as endangered and which could occur Grenada but are found in various locations of the West Indies, include the Brown Pelican Kirtland's Wood Warbler and five sea turtle species.

Since the wildlife habitats occuring at the project site are not particularly unusual for the island, there is no evidence to indicate that the project will have any deleterious effects on a critical habitat of any endangered species.

4.0 RECOMMENDED ACTIONS

This section summarizes specific recommendations for mitigating adverse project effects, enhancing beneficial ones and providing appropriate environmental safeguards.

4.1 Fuel Farm

It is recommended that appropriate spill prevention ad recovery measures be incorporated into the final design and construction of the fuel farm. The planned retaining walls should be completed and should be capable of containing the volume of the tank it includes plus two feet of freeboard. As a secondary precaution against tank or dike failure, it is recommended that a peripheral roadway be completed around the entire storage facility which would be super-elevated thus affording a back-up retention capability. In addition an oil-water collection, separator and reclamation system

should be installed for the facility. Small oil spills from the tanks, piping, valves and the service island would flow directly to the oil-water separator, with the reclaimed oil pumped into crude storage. Water from this separator plus normal runoff from the tanks and containment dikes will be discharged into drainage off the facility. It may be advisable to route rainfall runoff through a retention pond to prevent an overload of the separator during heavy rains.

Furthermore, similar precautionary measures for prevention and control of spills should be taken at the off-loading mooring and at the coupling of the marine and receiving pipelines.

It should be mentioned at USAID will be sponsoring a Grenadian Government employee to attend a "Disaster Preparedness Training Exercise" to be held in Miami in May, 1984. One of the main objectives of this Exercise is to familiarize individuals with appropriate measures for controlling petroleum related leaks and spills. Thus, a local expertise will be developed to insure that adequate spill containment and recovery facilities are installed at the new airport.

4.2 Embankment Protection: Runway West End

It is recommended that the proposed armor protection for the west end of the runway be completed in order to alleviate erosion problems and limit increased turbidity in the surrounding waters.

4.3 Armor Protection at Hardy Bay

It would be necessary to conduct a coastal engineering study to determine the precise requirements for armor protection at Hardy Bay. However, this protection has already been initiated and, if possible, it is recommended that excavation spoil from other site activities be deposited as incremental fill for the protection works.

4.4 Storm Drainage and Refuse Disposal

It is recommended that drainage outfalls near the edges of the terminal apron, hangar aprons and maintenance areas be designed to incorporate oil separators to trap all oils and fuels which reach the pavements due to incidental spills. Oil collected by the separators can be pumped into salvage vehicles on a regular basis. This system will limit the amount of oil contaminants which would be discharged with runoff waters into the coastal centers.

It is also recommended that leaks and spills be contained through the availability and use of absorbents. This would require a storage area for absorbent material and containers for solid waste disposal.

The plans for the incinerator, separate disposal of petroleum waste products at the vehicle washing area and grease traps at the maintenance area should all be implemented.

It is recommended that suitable handling and disposal facilities for solid refuse material which cannot be incinerated be identified and implemented.

4.5 Sewerage Disposal System

It is recommended that alternative sites for the proposed lagoon and outfall be investigated. One possibility would be in the vicinty of Black Bay. This would not present the problem of taking valuable private property, and since Black Bay is relatively deep and near the point, effluent releases here are likely to be dispersed more readily than in Hardy Bay.

The design of the lagoon should be reviewed. A possible alternative would be to use a two-section lagoon. The first could be used as a settling tank and the second for chemical treatment prior to discharge. Also, a means to dispose of sludge which will accumulate in the lagoon should be identified. The sludge would be useful as a fertilizer.

4.6 Location of Rescue Boat Facilities

As mentioned above, it is recommended that consideration be given to shifting the rescue boat facilities to Black Bay. The advantages of this move would include:

- use of a site already disturbed by filling operations;
- taking of valuable private property is unnecessary;
- Black Bay is sheltered and deep enough for drafts of any vessels which may be used; and
- provision of rapid access to both northern and southern shorelines.

4.7 Landscaping and Aesthetics

It is recommended that a landscaping plan be implemented for the entire airport site. The present plans include only the main terminal buiiding.

Currently, the visual quality of the site in poor, and improvement is highly recommended since the airport provides the "first impression" for the future incoming tourists. Of prime concern is the large amount of equipment, debris and abandoned, damaged buildings scattered around the sites. Some of this will be recoverable, but much will not and should be removed or disposed of. One good suggestion has been made to dispose of unusable equipment and materials in the fill required at the east end of the runway for the overrun.

4.8 Land Use Plan for Surrounding Area

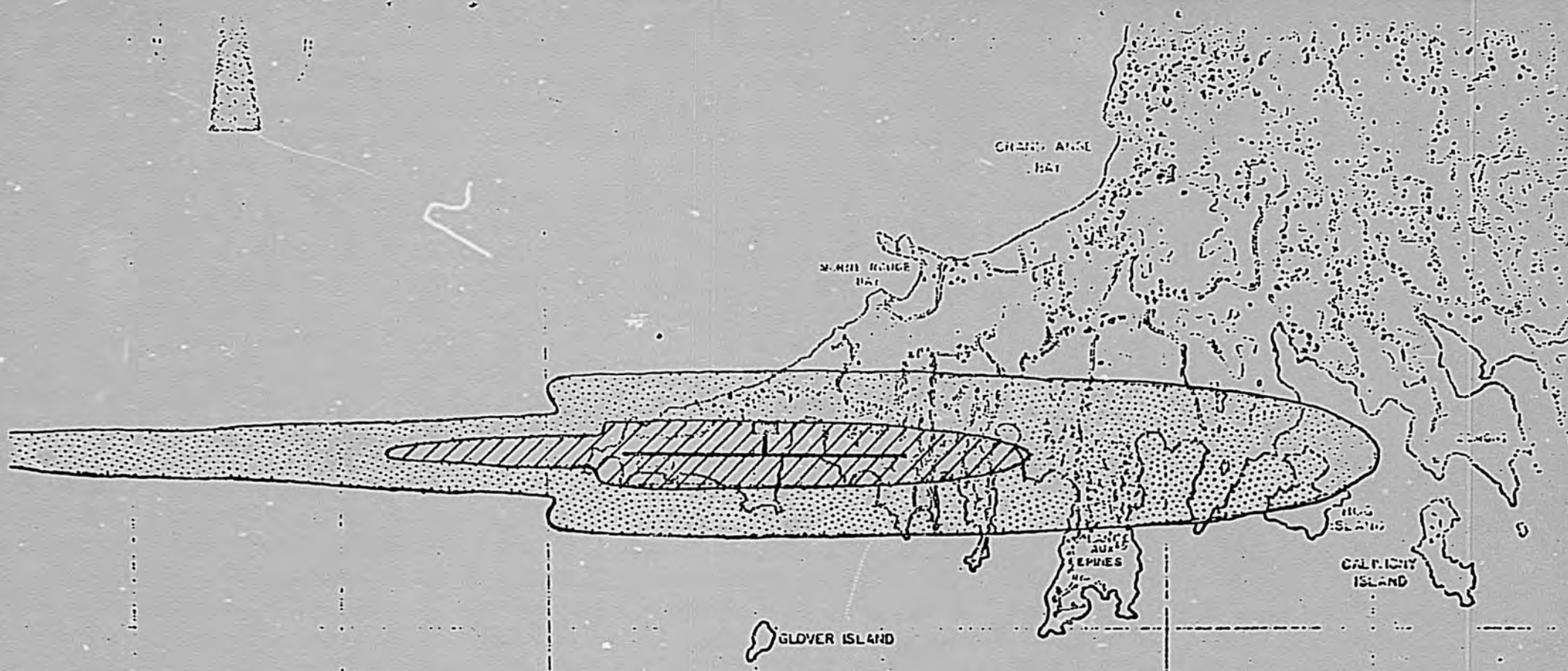
It is recommended that a land use plan for the area surrounding the airport be prepared and appropriate zoning and related development constraints identified. This plan should include a revised noise analysis of airport operations using the state-of-the-art NEP or WECPNL methods to develop noise contours and define compatible land uses in the region. The plan should also review ground traffic requirements for the future and recommend new or improved roads as needed. This would include a possible access road to Bagadi Bay and perhaps further to Grand Bay.

It is recommended that all practical means to control soil erosion during construction be taken. Permanent controls such as stabilization with topsoil, mulch, seeding and planting of non-paved areas should be undertaken immediately following construction activities.

If the airport operations are to eventually involve other income generating activities, it is possible to use airport land for crop production or perhaps grazing. In addition, the isolated part of Hardy Bay may be quite feasible for aquacultural activities. Since water here is brackish, it may be suitable for shrimp and/or marine finfish cultivation. There are a number of possible techniques available including pen enclosures, floating cages, etc.

In any event, it is recommended that the culvert under the runway be opened to enable free circulation of waters between both sections of Hardy Bay. Otherwise, the isolated part may begin to accumulate organic materials and wastes which could result in unpleasant eutrophic conditions.

During the construction period, sufficient sanitary waste disposal facilities should be provided at the camps.



SYMBOLS

SIMBOLOGIA

100 – 115 CNR (COMPOSITE NOISE RATING)

+ 115 CNR

REPUBLICA DE CUBA

DIRECCION DE INGENIERIA AERONAUTICA

AERODROMOS

Proyecto

PLAN DIRECTOR
(MASTER PLAN)
AEROPUERTO INTERNACIONAL POINT SALINES
GRENADA

NOISE CONTOUR
ESQUEMA DE RUIDO

Fecha JUL. - 81 | Proy. No. GPS - 03 - 81 | Plano No. 5/29

ANNEX E

5C(2) PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A. includes criteria applicable to all projects. Part B. applies to projects funded from specific sources only: B.1. applies to all projects funded with Development Assistance Funds, B.2. applies to projects funded with Development Assistance loans, and B.3. applies to projects funded from ESF.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT

1. FY 1982 Appropriation Act Sec. 523; FAA Sec. 634A; Sec. 653(b).

   (a) Describe how authorizing and appropriations committees of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that amount)?

   Congressional Notification by AID will be sent.

   YES

2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,00, will there be

	(a) engineering, financial or other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?	YES
3.	FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?	N/A
4.	FAA Sec. 611(b); FY 1982 Appropriation Act Sec. 501. If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973? (See AID Handbook 3 for new guidelines.)	N/A
5.	FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?	YES

6.	FAA Sec. 209. Is project susceptible to execution as part of regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.	NO
7.	FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.	Airport geared towards increasing tourism, flow of trade, facilitating commerce.
8.	FAA Sec. 601(b). Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).	Airport will increase tourism and commerce ties between two countries and, consequently, will spur private investment.

9.	FAA Sec. 612(b), 636(h); FY 1982 Appropriation Act Sec. 507. Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.	All possible steps taken.
10.	FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?	NO
11.	FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?	YES
12.	FY 1982 Appropriation Ac Sec. 521. If assistance is for the production of any commodity for export is the commodity likely to be in surplus on worl markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?	N/A
13.	FAA 118(c) and (d). Does the project comply with the environmental procedures set forth in AID Regulation 16? Does	YES

the project or program take into consideration the problem of the destruction of tropical forests? YES

14. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (dollars or local currency generated therefrom)? N/A

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria N/A

a. FAA Sec. 102(b), 111, 113, 281(a). Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and

otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries?

b. FAA Sec. 103, 103A, 104, 105, 106. Does the project fit the criteria for the type of funds (functional account) being used?

c. FAA Sec. 107. Is emphasis on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?

d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activitiy with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)?

e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"? (M.O. 1232.1 defined a capital project as "the construction, expansion, equipping or alteration of a physical facility or facilities financed by AID dollar assistance of not less than $100,000, including related advisory, managerial and training services, and not undertaken as part of a project of a predominantly technical assistance character.

f. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth?

g. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage

institutional development; and supports civil education and training in skills required for effective participation in governmental processes esential to self-government.

2. Development Assistance Project Criteria (Loans Only) N/A

a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan, at a reasonable rate of interest.

b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

c. ISDCA of 1981, Sec. 724 (c) and (d). If for Nicaragua, does the loan agreement require that the funds be used to the maximum extent possible for the private sector? Does the project provide for monitoring under FAA Sec. 624(g)?

3. Economic Support Fund Project Criteria

a. FAA Sec. 531(a). Will this assistance promote economic or political

	stability? To the extent possible, does it reflect the policy directions of FAA Section 102?	YES
b.	FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities?	NO
c.	FAA Sec. 534. Will ESF funds be used to finance the construction of the operation or maintenance of, or the supplying of fuel for, a nuclear facility? If so, has the President certified that such use of funds is indispensable to nonproliferation objectives?	NO
d.	FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?	N/A

Certification Pursuant to Section 611 (e) of the Foreign Assistance Act of 1961, As Amended

Subject: Grenada, Capital Assistance, Point Salines Airport Project

I, James W. Habron, as Director of the United States A.I.D. Mission to Grenada, having taken into account inter alia, the maintenance and utilization of projects in Grenada, previously financed or assisted by the United States, do hereby certify that, in my judgment, Grenada has both the financial capability and the human resources to maintain and utilize effectively the proposed Point Salines Airport Project. This judgment is based primarily on the facts developed in the Project Paper for the proposed project and A.I.D.'s review of the financial assistance previously provided to Grenada.

James W. Habron
Director

APRIL 3, 1984
Date

ADVISORY COUNCIL OF GRENADA

ANNEX G

OFFICE OF THE CHAIRMAN
P.O. Box 315
St. George's
GRENADA, West Indies

April 2, 1984.

Mr. James Habron
AID Representative, Grenada
C/o American Embassy
Ross Point
St. George's
Grenada
WEST INDIES.

Dear Mr. Habron:

Re: Point Salines Airport

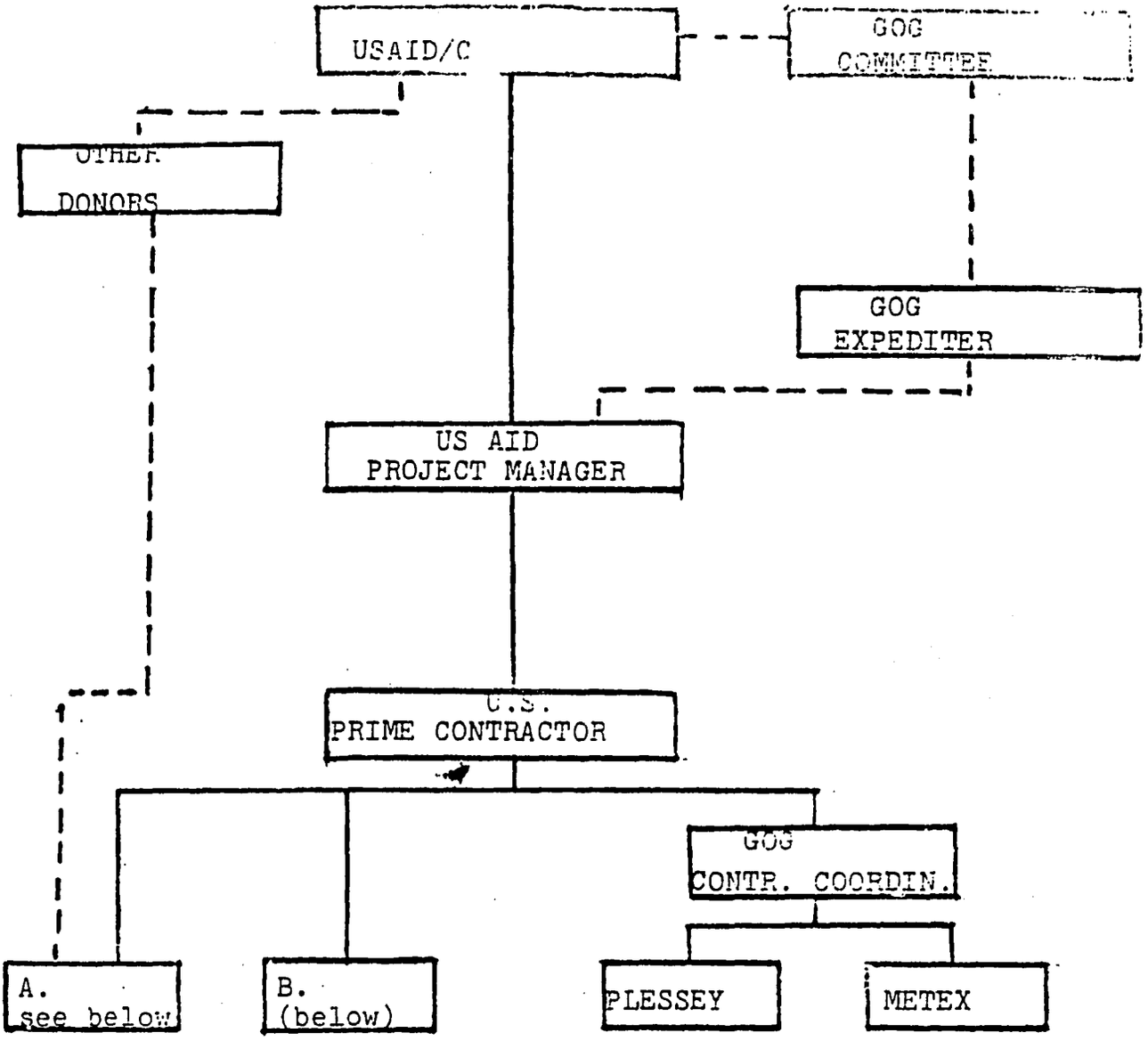
The Interim Government of Grenada requests the assistance of the United States Agency for International Development in completing the International Airport at Point Salines.

It is understood that our joint intention is to bring the airport to an acceptable International standard so that certification may be obtained to permit the operation of large jet aircraft by October, 1984. Full completion of the airport in accordance with designs derived from this assistance will occur after that time.

Sincerely yours,

Nicholas Brathwaite
CHAIRMAN
INTERIM GOVERNMENT OF GRENADA.

ANNEX H

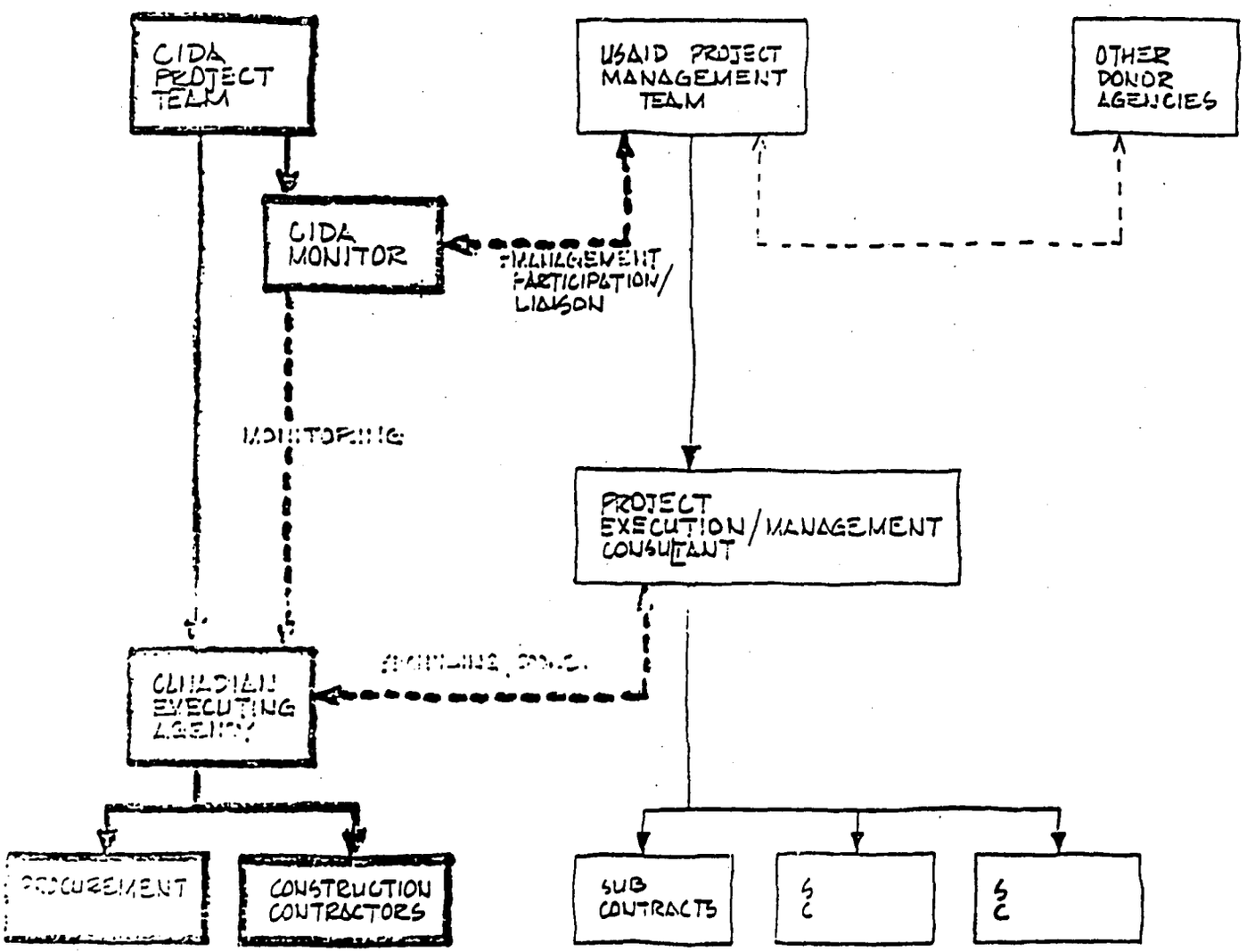


A. Other Donor's Contractors

B. Project Construction Activities

ORGANIZATION CHART

SALINE AIRPORT CONSTRUCTION



PROJECT ORGANIZATION DIAGRAM.

CANADIAN COMPONENT

TECHNICAL EVALUATION CRITERIA

Although price has not been assigned a numerical weight in the technical evaluation criteria shown below, price will be a factor in determining who receives the contract. Award will be made to the offeror whose overall proposal is determined to be most advantageous to the Government, price and technical factors considered.

Criteria			Weight
1.	Contractor experience		15%
	A. Construction Contracts	6%	
	B. Construction Management	5%	
	C. Airport Design	4%	
2.	Job Capacity		15%
	A. Quality of firm's proposal	5%	
	B. Ability to perform with own staff	5%	
	C. Ability to start promptly	5%	
3.	Qualifications and Experience of Proposed Personnel		45%
4.	Work Plan (Statement of Work Response and Approach to Problems)		25%