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Aqaba-Eilat Airport

Feasibility Study



Executive Summary

July 1996

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FOREWORD

This document is a reprint of the Executive Summary contained in the main report of the Aqaba-Eilat Airport Feasibility Study. This document contains references to the main report which should be consulted for further details on the results of the feasibility study.

Executive Summary

The October 1994 signing of the Peace Treaty between the State of Israel and the Hashemite Kingdom of Jordan signaled the beginning of an era of unprecedented and historic cooperation between these two nations. The process of normalizing relations between the two countries has many facets and has been gradually codified in individual bilateral agreements. These accords address separate political, social, and economic areas such as telecommunications, transportation, maritime borders, and science and technology. One such bilateral specifically addresses issues in the Aqaba-Eilat region at the southern end of the respective countries, and it identified as one area of cooperation the establishment of a joint Israeli/Jordanian airport to serve the needs of the region.

In support of the peace process, and especially the bilaterals addressing transportation and the Aqaba-Eilat region, the United States Trade and Development Agency (TDA) provided a grant to the Jordan Civil Aviation Authority (JCAA) sponsoring a study to assess the technical, operational, and financial feasibility of building such an airport. The JCAA awarded Lockheed Martin Management and Data Systems Company a contract to perform this study, which was conducted between October 1995 and June 1996.

The Aqaba-Eilat Airport Feasibility Study focused on the development of a safe and efficient airspace environment in the Aqaba-Eilat region. This includes the specification of plans for new/expanded terminal facilities, and airside facilities such as runways, taxiways, and aprons. Included is the assessment of improved air traffic control capabilities, specifically the deployment of a surveillance radar serving the terminal area. A principal objective was that this airport would both reflect and complement the aggressive economic growth plans for the region.

Specific objectives for both the study and the airport were developed by the study team and approved by the Joint Steering Committee.

In the final analysis, however, the Aqaba-Eilat Airport Feasibility Study served two primary purposes. First—as noted above—in full accordance with the provisions of the study Terms of Reference (TOR), an airport and terminal configuration was developed and analyzed from technical, operational, and financial perspectives. This effort resulted in the specification of an alternative which in meeting all the various study requirements necessitated tremendous capital requirements. Second—and as importantly—when it became apparent that the financial feasibility of this particular complex was uncertain, an additional alternative, outside the provisions of the TOR, was developed. This additional alternative, and in particular its first phase, more directly addresses specific fiscal considerations, and provides a basis for further analysis. While there obviously remains an immense amount of planning, design, and development effort in order to complete the airport project, the results of this study suggest that such a facility could be technically, operationally, and financially feasible.

Figure 1 depicts the overall approach taken by the study team. Indicated are the general task areas, as well as key decision points.

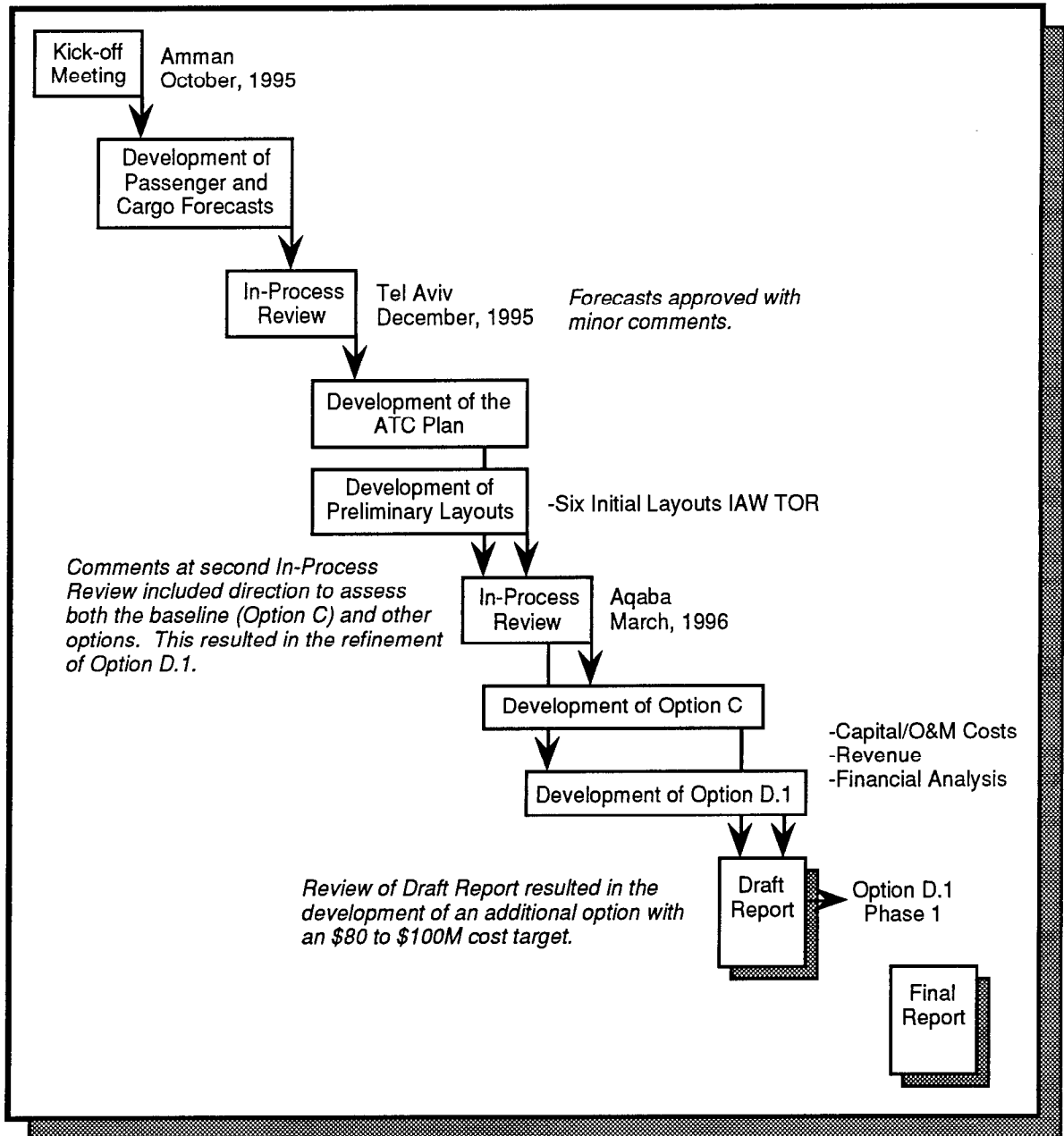


Figure 1. General Approach and Task Flow

A number of points concerning this approach are salient:

Initial Kick-off Meeting, October 1995: Final agreement on the Terms of Reference was reached. The study team was directed to develop six initial concepts for the airport configuration/ terminal layout. The Joint Steering Committee would then select one of these for further development.

In-Process Review, December 1995: The passenger and cargo forecasts were approved with minor comments. Similar to the first meeting, efforts at this point also focused on data collection activities.

In-Process Review, April 1996: At this important meeting, the size and the complexity of the project was becoming apparent. The study team was directed to continue with the development of the primary alternative in accordance with the Terms of Reference, but also to investigate other alternatives which would meet the general requirements of the airport, but in a more easily implementable program. The primary alternative was Option C, the alternate Option D.1.

Review of Draft Report, May 1996: The Draft Report confirmed the size and complexity of the airport required to meet all the provisions specified in the TOR (Option C). The results of the analysis of the alternate option (D.1) showed that such an approach appeared more feasible, given the relaxation of certain of the TOR groundrules. The study team was directed at this time to provide one further option with a cost target of \$80 to \$100 million. This more “modest” approach fully reflected the desire to develop an airport which was as financially self-sufficient as possible. This resulted in the development of a phasing strategy to Option D.1, wherein the first phase was as complete as possible, and could function as an effective and efficient airport with no further investment.

The study Terms of Reference (TOR) comprised eight specific tasks, summarized below. Details for each of the tasks are contained in the main body of the report.

Task 1 - Review of Existing Facilities and Equipment

The purpose of this task was to establish the technical, operational, and legal baseline that the remainder of the study would be based upon. This included reviewing the configurations of the current air transportation infrastructure within both countries, plans for future enhancements and expansion, and laws and policies governing air transportation and air traffic management and control. Data collection and system/facility review efforts were, naturally, concentrated at the beginning of the study, but did continue throughout the entire study period. The IAA and JCAA were by far the greatest source of data; but meetings, interviews and telephone conversations with numerous third parties—such as airlines, the Aqaba Region Authority, and local officials in both Eilat and Aqaba—also provided a wealth of information. The data collection and system/facility review effort included four in-country visits by various members of the study team.

Task 2 - Review all Available Passenger and Cargo Forecasts
The TOR specified the development of three forecast scenarios. A generic approach to traffic forecasting usually includes the development of a core, or baseline, forecast and alternatives to this baseline that represent a “best case” or higher-growth option and a “worst case” or lower-growth option. This, in essence, is a single forecast bounded by the likely sensitivities of the process.

Because of the unique requirements associated with projecting air traffic demand to a resort destination, a technique more sophisticated than the generic approach was indicated. The study team accordingly developed three separate forecast scenarios reflecting alternative “futures” for the region; that is, each scenario is a product of a different set of assumptions regarding future social, political, and economic factors in the Gulf of Aqaba region. A major challenge in this effort is that, in order to be useful, these scenarios had to be sufficiently different to produce meaningful alternative outcomes. After reviewing the history and analyzing probable development paths for the region, the three mutually exclusive development scenarios were defined:

- Business as Usual,
- Accelerated Growth, Infrastructure Constraints
- Continuous Rapid Growth

Figure 2 illustrates the total yearly enplanements associated with each of these forecast scenarios.

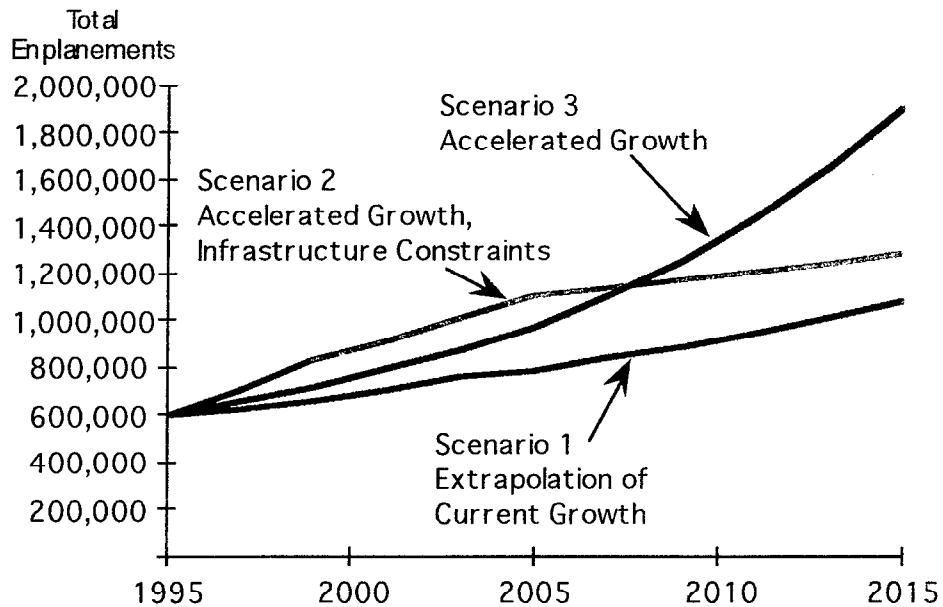


Figure 2. Aqaba-Eilat Passenger Forecasts

Cargo volumes (contained in Appendix E) were forecast based on a demand model that relates observed cargo volumes at resort areas to the number of hotel rooms at the resort area. Based on a sample of a number of such areas, 1.8 annual tonnes of cargo can be expected for each hotel room at a resort. Hotel rooms were projected for each scenario based on existing and short-term relationships between air travelers and hotel rooms at Aqaba-Eilat.

Task 3- Prepare a Preliminary Layout of Airport Facilities-

This section documents the analysis supporting the development of a preliminary airport layout meeting the requirements of the study terms of reference (TOR), the existing facilities in the region, and prudent airport design standards and processes. Factors such as efficient aircraft operations, cost, flexibility, and the impact of sovereignty issues have been addressed to investigate and evaluate the potential for this airport.

Following additional analysis of projected traffic demands, specifically focused on traffic peaking, a set of parameters was developed to guide subsequent design efforts. Key factors that affect the basic operational profile of the airport, and in particular, the terminal facilities include:

- Terms of Reference
- Goals and objectives
- Security, border control, and customs requirements
- Extent of integration (efficiencies to be realized through integration, or sharing, of various functions between Jordan and Israel)

Specific requirements were developed for the following main categories:

1. Airfield and navigational aids
2. Terminal area facilities
3. Ancillary facilities

In accordance with the parameters developed for planning the new airport, the examination of alternative layouts for airport facilities focused on finding a solution that not only maximized the efficiency, cost and flexibility, in light of variations in the demand forecast, but also maximizes the potential for—and enables flexibility for changes due to—the addition of facilities to be used by both countries.

Based on the above analyses, Alternative C (Drawing 15) was chosen as the primary option. This layout best reflects the difficult balance among the sometimes disparate groundrules and requirements while ensuring operational efficiency and flexibility for growth. A plan for the airport considering the range of development as projected for the year 2015 (from each of the three passenger forecast scenarios) was also developed.

In the evaluation of development alternatives, it was assumed that the airport would be phased such that facilities for both Israel and Jordan would be constructed to open at the same time. However, because of the Jordanian terminal, runway and other facilities currently require some minor

improvements, and with the aim of saving capital money in the short term, a phasing plan was devised to minimize the initial investment while maximizing convenience for the airports users. In addition, this phasing plan allows for a gradual integration of operations with an interim period for refinement in coordination in such matters as ground operations, security, etc. The more conservative approach, therefore, would appear to be the allowance of more time for completion of the cross-border terminal complex.

The Consultant also examined the possibility of locating the new terminals adjacent to the existing runway as shown in Drawing 17. The alternative, named D.1 because of its similarity to the previously developed Alternative D, proposes that the airport expansion program consist of the construction of a new apron-terminal complex on the west side of the existing runway. A new parallel taxiway would also be required.

The advantages indicated by such a strategy relate mainly to cost savings, land-utilization, and environmental impact. In addition, the topography of the site immediately adjoining the runway, which slopes away from the runway to the east, could be exploited to create a more-flexible two-story terminal complex, with relatively minor cost implications. The disadvantages relate to the political and operational agreements required for such a configuration, which may be more complex than those required for a solution that provides Israel with its own facilities, on its own land, and with all of the implications for sovereignty etc. However, the magnitude of difference in the complexity of such issues remains to be determined and is not addressed in this report.

Task 4- Develop a Regional ATC Plan-

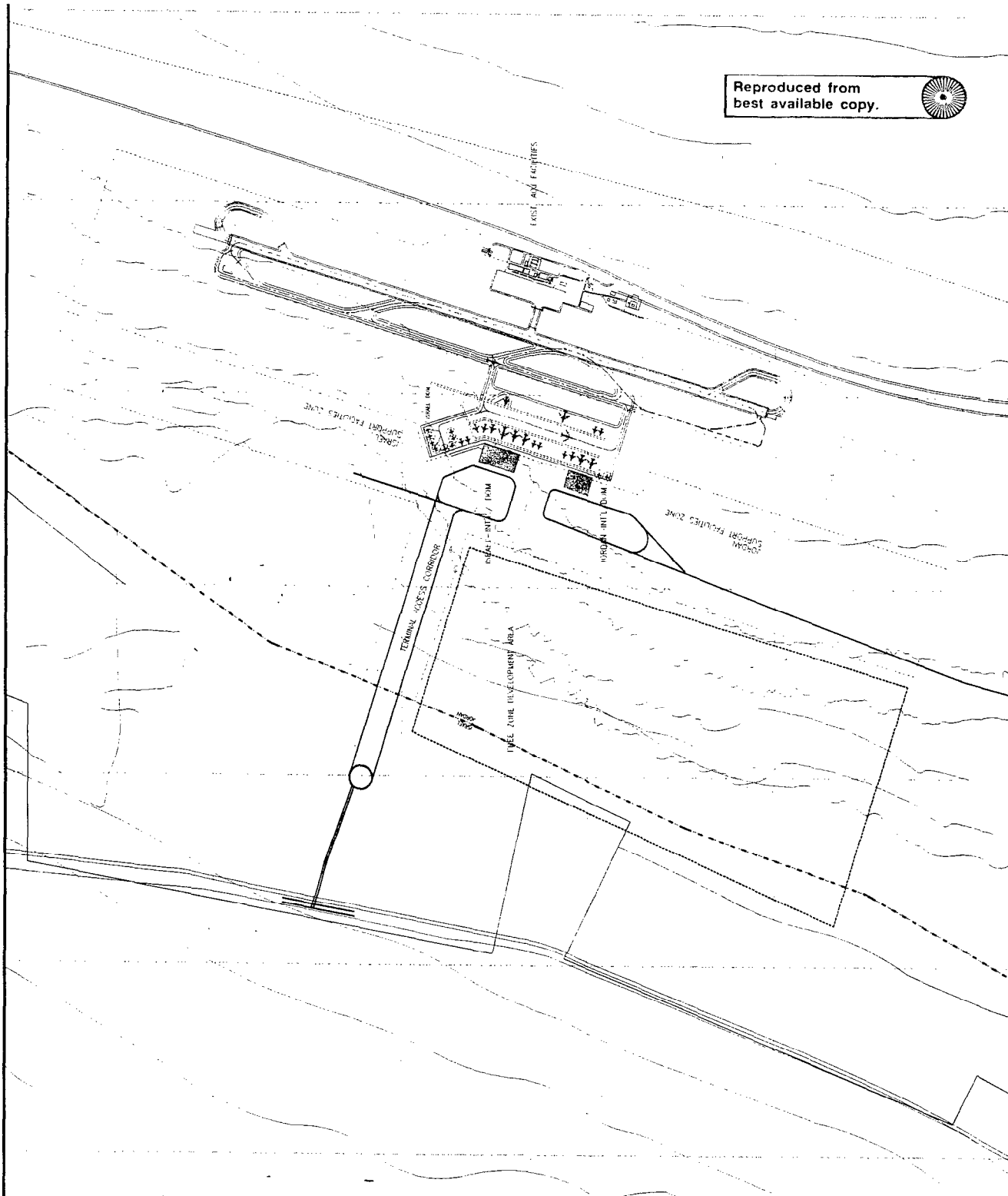
Task 4 examined rationalization of Aqaba-Eilat airspace procedures and facilities. The proposed binational airspace structure will be efficient and able to meet projected capacity requirements and will enhance safety through increased error margins and operational flexibility.

The existing ATC framework—established prior to the peace process—cannot efficiently accommodate increased traffic. These limitations were highlighted in a previous study:

- Airspace is not flexible due to dissimilar national procedures and policies, and due to separation requirements and terrain
- Significant separation is required in absence of surveillance capability
- Interfacility communication weakness inhibits coordination

Task 4 was conducted using ATC expertise, an ATC simulation tool, and a radar siting tool. The simulations used prototype SIDs and STARs, and projected traffic, to examine potential new procedures and the radar/non-radar environment. One item of particular note is that the simulation indicated that the new Aqaba-Eilat airport will comfortably handle near-term projected traffic without a second runway if a taxiway is constructed parallel to the existing Aqaba runway.

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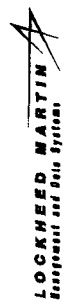


ACABA-EILAT
Airport Feasibility Study

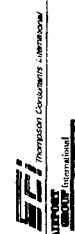
Alternative D.1

Airport Layout Plan

Drawing No. 10-0000
Scale 1:20,000
Date 10/15/1995



LOCKHEED MARTIN
Equipment and Site Systems



SCI
Transport Components International
AECOM International

Task 5- Develop Capital and Operations Cost Estimates-

Detailed capital cost estimates have been developed for the primary configuration—Alternative C—and one option—D.1. Capital estimates are based on the proposed phasing plan, but are easily aggregated if any of the phases were to be combined. Operations costs estimates—applicable to either alternative—were developed based on information from comparable airports in the region. Together these form the basis for the overall financial model.

Costs are summarized in the table below for the first phase of development. The amounts are expressed in future dollars (i.e., adjusted for inflation through the construction period assumed to take place from 1997-1999) which results in differences from those indicated from the Study section for Task 5. The analysis indicates that estimated phase I project costs are more than 50 percent lower for Alternative D.1 as compared with Alternative C (the recommended alternative). To place the figures in context, the reader should understand that the construction amounts were estimated from conceptual drawings which are not sufficiently detailed to obtain firm bid commitments from international construction companies.

**Phase I Project Cost Breakdown and Comparison
(000's)**

<u>Description</u>	<u>Alternative C</u>	<u>Alternative D.1</u>
Construction costs	\$124,135	\$57,937
Nav aids	<u>2,962</u>	<u>532</u>
Total "Hard" Costs	\$127,097	\$58,469
General requirements	\$6,355	\$2,923
Design contingency	16,014	7,367
Construction contingency	11,957	5,501
Project management	5,650	2,599
Architectural and engineering	12,900	5,900
Finance fees and premiums	2,832	1,737
Interest during construction	<u>17,005</u>	<u>7,912</u>
Total Project Costs	\$199,810	\$92,407

Project costs summarized for phase II are provided in the table below. Consistent with the table above, these amounts are shown in future dollars. The two alternatives both project construction to occur during the years 2002-2004. Again, Alternative D.1 has a significantly lower cost with this phase costing more than 30 percent less than Alternative C.

Phase II Project Cost Breakdown and Comparison (000's)

<u>Description</u>	<u>Alternative C</u>	<u>Alternative D.1</u>
Construction costs	\$52,925	\$35,647
Nav aids	<u>931</u>	<u>943</u>
Total "Hard" Costs	\$53,856	\$36,590
General requirements	\$2,693	\$1,829
Design contingency	6,786	4,610
Construction contingency	5,067	3,442
Project management	2,394	1,627
Architectural and engineering	5,500	3,700
Finance fees and premiums	1,252	986
Interest during construction	<u>6,985</u>	<u>4,739</u>
Total Project Costs	\$84,533	\$57,524

Task 6- Conduct a Revenue Analysis and Financial Analysis-

The revenue projections for the proposed Aqaba-Eilat airport complex are based upon the forecasts of passenger traffic, cargo activity and aircraft flight activity developed under Task 2 of this study. These projections cover traffic and flight activity that reflect three different alternative development scenarios regarding growth in domestic traffic and international tourism to the region.

Revenues have been projected using two different pricing levels. These approaches are:

1. Use of pricing levels provided by the Israel Airports Authority (IAA) and the Jordan Civil Aviation Authority (JCAA) for aviation related charges and terminal rents
2. Adoption of airport charges estimated by the Consultant to be commercially reasonable given the projected role of the airport as a gateway for international tourists transported primarily on charter services

The projections have not been linearly related to cost projections for the complex, which were prepared on a parallel track with this revenue forecast. The revenue structure and levels, therefore, reflect traditional airport pricing and are not set to ensure cost recovery for each major operational or capital cost activity.

Examination of the revenue projections for the year 2000 for traffic scenario 2, "Accelerated Growth, Infrastructure Constraints", illustrates the magnitude of the differences produced by the two approaches:

	<u>Current Rates</u>	<u>Commercially Feasible</u>
Airside	\$ 5,868,530	\$ 9,189,208
Landside	\$ 3,649,089	\$ 4,381,908
Total Revenue	\$ 9,517,619	\$13,571,116

A financial analysis comparing Alternative C to Alternative D.1 was conducted. The Consultants believe that this later alternative merits analysis because it is functional, better economically, and more consistent with the spirit of Jordanian-Israeli cooperation. Alternative D.1 also represents an option that is a meaningful contrast financially to Alternative C.

The Consultants expect that the project will be financed with 100 percent debt which will be supported by adequate guarantees from the governmental sponsors or financial institutions acceptable to the lenders. The debt will fall into one of two categories: Export Credit Agency (ECA) financing; and, term loans that would probably be government to government in nature. The ECA financing from U.S. Export-Import Bank—or possibly other comparable institutions from Organization for Economic Cooperation and Development (OECD) member countries—would provide financing for up to 85 percent of eligible export and construction costs according to the organization’s consensus rules.

The Consultant developed full financial models under twelve hypotheses. There were two project alternatives, two revenue scenarios, and three traffic scenarios. The “Base Case” assumes development of Alternative C (the Primary Alternative), rates and charges that mirror the input from the JCAA and the IAA over the course of the study, and traffic scenario 2 (accelerated growth, infrastructure constraints). The “Alternative case” represents the same major assumptions applied to Alternative D.1.

The Consultant discontinued viewing this project as a privatization candidate when it became clear that there would not be a structure that could provide private entities an adequate FIRR to compensate them for their risks. At that point, the focus shifted to the levels of sponsor subsidies that would be required in order for the enterprise to meet all of its financial obligations. The table below presents a summary of the estimated subsidies required for the first operating year under the sets of assumptions analyzed:

Year 1 Subsidy Requirement (000's)

Traffic Scenario	<u>Project Alternative C</u>		<u>Project Alternative D.1</u>	
	Provided Rates	Commercially Feasible Rates	Provided Rates	Commercially Feasible Rates
1	\$30,881	\$28,526	\$15,643	\$13,288
2	\$27,570	\$23,552	\$12,332	\$8,314
3	\$29,027	\$25,778	\$13,790	\$10,540

It should be noted that the subsidy requirements for Alternative D.1 using commercially feasible rates are similar in scope to current subsidies.

Task 7- Recommend Optimal Sizes for the Project-

At the beginning of this study, one of the ultimate goals of the effort was to determine a size for the project which would achieve a proper balance between anticipated revenues, and estimated airport operations and debt-service costs. As discussed in section 7, however, achieving this balance was not possible, and the airport project will require subsidies for most of the 20-year project period. This fact is not surprising in light of the extensive Government subsidies currently provided to both the Eilat/Ovda facilities and the Aqaba airport.

We have therefore presented a primary alternative which meets the technical and operational requirements specified in the Terms of Reference (TOR), and have proposed a project phasing plan which will maximize the operational capability of the new airport while minimizing capital requirements. In addition, we have developed an alternative option—D.1—that offers higher overall efficiency and significantly reduces costs. This alternative does not comply with all requirements of the TOR, specifically that which specifies that each country's terminal will be located in that country; however, the necessary subsidies are only marginally more than current requirements. The first phase of this option has been specifically developed to provide a stand-alone facility capable of efficiently supporting airfield operations well into the next decade. This minimizes capital requirements and provides an opportunity for evaluation of future airfield expansion needs.

Although the cost of this option can be further reduced by approximately \$12 million if the Israeli domestic terminal is excluded, this alternative is not economically justified because Israeli domestic traffic is a major source of airport revenues.

A stand-alone financial analysis, summarizing these results, has been provided under separate cover.

Task 8- Identify Training Requirements-

The training section of the Aqaba-Eilat feasibility study identifies the projected training requirements for the airport complex and is organized into three sections:

1. Air Traffic Control (ATC) Operations
2. Navigation Aids and Communications Equipment
3. Operations of Airport Facilities and Equipment

Training requirements were based on the development of Aqaba-Eilat as a major international airport requiring the implementation of ICAO international standards and recommended practices.

Section 9 specifies the training requirements—course descriptions, length of training required, and suggested staffing—recommended for the new facility. It should be noted that these are preliminary estimates only and will require refinement as the project progresses.

Follow-on Activities

While this feasibility study has addressed the first-level technical, operational, and financial considerations attendant with the proposed airport, the focus of the effort must now shift to the programmatic aspects of the project. Of primary importance is the formation of a Joint Powers Airport Authority chartered by both Governments to conduct the further business of the project. The formation of this Authority will necessitate a “bootstrap” approach wherein the Authority will initially operate under interim agreements until the necessary formal enabling legislation can be passed by both countries.

Figure 3 shows the initial strategic (national/bi-national) and tactical challenges facing the new Joint Authority. Among the most important strategic challenges are:

The Creation of Joint Powers Airport Authority

Development and operation of the proposed airport will be the responsibility of an appropriately chartered Joint Airport Authority. While a number of different management approaches (e.g., private, Government, quasi-Government) are used throughout the world, it is recommended that an approach similar to those used in France, West Germany, and the United States, be adopted. A single authority, consisting of dedicated (full-time) representatives of both countries is preferred.

The Authority’s charter to include all facets of airport development and operation:

- Planning
- Coordination with international, national, and regional authorities
- Ability to acquire funds
- Oversight of airport development (construction)
- Operations and management of airport

Changes to Israeli/Jordanian Laws/Regulations/Protocols

Laws covering commerce, transportation, security and other subjects will have to be reviewed and amended as necessary. New laws may be required to address areas not already covered. Guidance for this effort can be found in other bi-national airports such as Geneva (France/Switzerland) and Basil-Mulhouse (France/Switzerland/Germany).

Development/Management of a Long-term Funding Strategy

The authority will have to develop and implement a funding strategy taking full advantage of all sources of capital available for transportation infrastructure improvements throughout the world.

Increased Regional Coordination

Integration of planning functions in the Gulf of Aqaba region will be required. The airport will be a cornerstone of the total effort to improve the overall economy in the area.

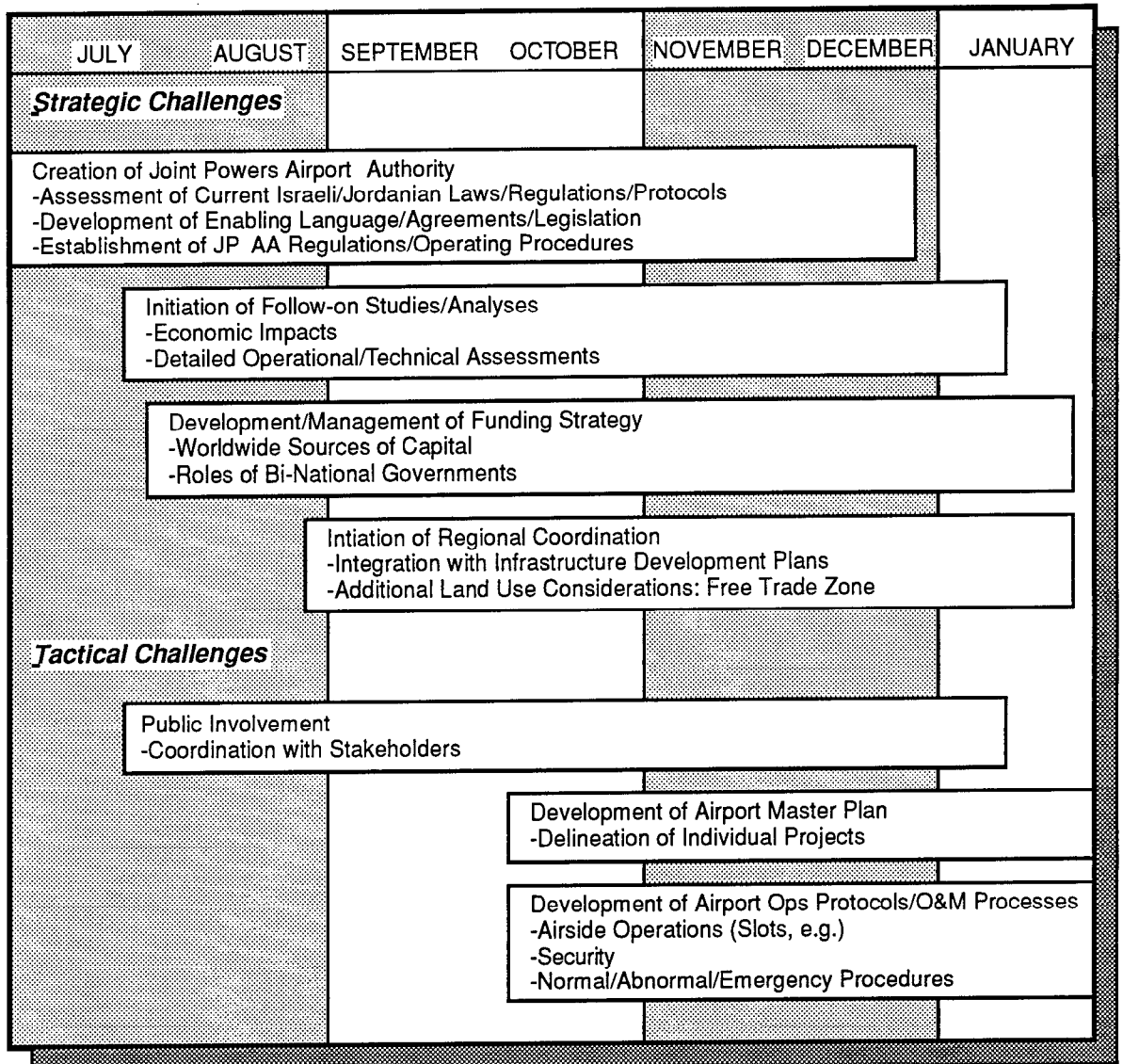


Figure 3. Required Follow-on Activities

Tactical Issues

The authority will also be faced with various tactical issues. Among these are:

Increased Public Involvement

Efforts are now required to acquaint and educate the public with the project; solicit feedback; and incorporate comments into the process. This process will include general efforts at the national level, as well as specific work in the Gulf of Aqaba region.

Development of the Airport Master Plan

This effort includes:

- Delineation of individual projects
- Development/evaluation of project implementation options
- Efficient implementation of projects.
- “Building Block” approach focusing on early service improvements

Ensurance that Airport Development is Properly Integrated into a Comprehensive Regional Transportation System

Additional Development of Land in Airport Area: Free Trade Zone

Although the Joint Airport Authority will be responsible for these items, it will be incumbent upon the governments of the State of Israel and the Hashemite Kingdom of Jordan to establish the proper environment for the development of this airport. This environment will be created by each government evidencing substantive support through:

- National Leadership/Public Policy
- Securing Initial Funding for the Joint Authority
- Legislative/Regulatory Support

These efforts will provide the necessary foundation for the Joint Authority’s activities.

