



**US Army Corps
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NEPO

NEAR EAST PROJECT OFFICE
Tel Aviv, Israel

THE ISRAELI AIRBASE PROGRAM



LESSONS LEARNED



Lessons Learned on Israeli Airbase Program

U. S. Army Corps of Engineers

**Near East Project Office
BG(P) John F. Wall, Commander**

September 1982

Tel Aviv, Israel

FOREWORD

One of the U. S. Army Corps of Engineers' most sensitive and highly visible international construction projects was construction of two fighter airbases in Israel--a project which reflects a national commitment, through Presidential diplomacy, to the establishment of a permanent peace in the Middle East. This mission was linked to the terms of the Camp David Accords requiring withdrawal of Israeli Forces from the Sinai by 25 April 1982.

The "fast track" nature of this project placed heavy demands on all concerned. Moreover, the "cost plus" contracting required intense involvement by Corps personnel.

This document presents specific problems from a "Lessons Learned" standpoint with a view to advancing Corps-wide awareness of problems associated with projects of this nature.



J. K. BRATTON
Lieutenant General, USA
Chief of Engineers

MISSION

. . . Build two technically advanced high-quality airbases in three years and at a reasonable cost . . . in accordance with the Camp David Peace Agreement.

ACCOMPLISHMENT

In April 1982 (9 months earlier than contractually required), the U.S. Army Corps of Engineers delivered two high-quality fully operational airbases, Ramon and Ovda, to the Israel Ministry of Defense at a cost of within 4 percent of the original estimate.

	Airbase		Total
	Ovda	Ramon	
Area, square metres			
Vertical structures floor space	230,000	240,000	470,000
PCC pavement	300,000	320,000	620,000
Asphalt pavement	1,200,000	1,100,000	2,300,000
Project within fences	34,500,000	22,000,000	56,500,000
Volume, cubic metres			
Excavation	11,000,000	12,000,000	23,000,000
Concrete	400,000	500,000	900,000
Weight, metric tons			
Cement	127,000	150,000	277,000
Bitumen	18,000	15,000	33,000
Reinforcing steel	16,500	17,300	33,800
Structural steel	2,100	2,700	4,800
Length, linear metres			
External utility installations	644,000	558,000	1,202,000
Number			
Precast wall panels	1,800	1,800	3,600
Design drawings	5,720	6,150	11,870
Labor, manhours			
Direct	13,200,000	10,270,000	23,470,000
Indirect	9,600,000	6,430,000	16,030,000
Total	22,800,000	16,700,000	39,500,000

The Israeli Airbase Program (IAP), a fast-track construction project in a technically advanced country, has generated some lessons of possible benefit to others.

The staff of the Near East Project Office (NEPO) made a midcourse review of the project and identified and set down some of its views of managing cost-plus-fixed-fee contracts in a fast-track environment. This review was updated and the following are excerpts that I consider key.

1. A fast-track project should be a turnkey project. The Corps should prepare a total turnkey management package with which to approach the customer (the user of the facility). Under this concept, the Corps would present a proposal based on the user's specifications. Once the proposal was accepted, the Corps would have complete responsibility for and authority over all aspects of the project: design, execution, funding, etc. When the project was complete, the user and the Corps would hold a joint inspection and punch list. When the facility was accepted, the Corps would hand over the keys and walk away.

A turnkey arrangement would have many benefits: the Corps would perform at maximum efficiency the construction mission that it is trained to do; changes would be kept to a minimum, resulting in savings of time and money; and the management of the turnkey project would be orders of magnitude easier than any other arrangement.

2. Put your money where your mouth is. Considerable talk was made that the IAP was the most important job in the Corps, but obtaining the best people when the project most needed them was not always possible. This applies to military and

civilians.

At one time during the staffing of NEPO, we exhausted a candidates list containing the names of 23 colonels (O-6s) because not one officer on the list would take (or was not meaningfully told to take) a high-risk Area Engineer job. Some civilians were necessarily promoted a grade or two higher than they would have been ordinarily.

The point is that everyone expended time, much of which was simply not readily available, to train and motivate individuals. Incentives, such as making the military offers as commands in name and selection and building up key civilian jobs, are necessary. Contract Officer jobs should not be equivalent to Area Engineers but to construction districts or commands; area engineer people and organizations in districts do not equate with these jobs. Send the best people first.

As far as the contractors are concerned, insist in contract negotiations that the design/construct contractors (DCCs) provide their best qualified personnel and that organization charts, staffing levels, and resumes of key staff be provided to be part of the selection process.

3. The boss should select his key people. The project commander should personally select his key people and not have them issued. Build the organization around seven to ten key people owing their loyalty to the on-the-job-commander.

4. Duplicate or exceed the rank of the customer in a highly political atmosphere. A flaw from the outset in Israel was the inability of the original NEPO "manager," through inadequate rank, to control his own destiny with two extremely tough brigadier generals (the user, MOD BG Bar-Tov, and the customer, USAF BG Hartung)

and two extremely tough, competent O-6 Area Engineers. Put a general officer in charge from the outset.

5. Consider making the Corps the Program Manager for DOD. The USAF formed a liaison team at the site to coordinate with the IAF site engineer that frequently got into the Corps business of construction. Given the sophistication of the user, who knew what he wanted, the Corps could have handled the functions at the program level.

6. In a foreign country, the Project Manager must be a member of the U.S. Embassy/Country Team. When the Corps is given a major construction mission in a foreign country that by its very nature impacts a broad range of the host country's infrastructure, it is imperative that the Corps' Project Manager be a member of the Country Team.

7. Stay till done. Key individuals must commit for the duration. Before the job was 10 percent complete, Ovda had gone through four changes at the top.

8. The fire fighter must be able to direct the water hoses. NEPO should have reported from the start as an operating element of OCE. If Washington is to make decisions that affect the mission or if Washington must make decisions to ensure the timeliness, there must be clear lines to OCE.

In my judgement no division would have been capable of proper NEPO support, for it quickly deteriorated to personal involvement of the Division Engineer without

involvement of his staff. In any event, if a general officer had been present at the start, then NEPO would have been a separate operating element. Huntsville and CEBMCO are early precedents of direct lines to OCE; MX is a current one.

9. Temper the military sharpness of the objective with tried civilian managerial competence. One very bright spot in the IAP was the decision to place a civilian deputy at each site. The decision should have been made from the outset and the military deputy concept abandoned. High-level civilians at the area headquarters must owe complete loyalty to the Project Manager.

It has been readily apparent that we in the Corps, both military and civilian, have an experience gap when it comes to cost-plus contracting. This gap should be addressed in the OCE-sponsored training arena.

10. Consolidate contracting officer responsibility at one location. This was done at first but then was moved to the work locations in order to streamline the decision making, to enhance the role of Area Engineers, and to honor a commitment of the ex-Chief of Engineers, General Jack Morris.

The decision to consolidate contracting officer functions at headquarters or to leave at an Area Office should be made by the commander based on his assessment of work load, past experience, and ability of the Area Office staff.

11. Cash in on economics of scale. Use of one DCC would have saved huge sums of money and time and would have been at least one order of magnitude easier for the Corps to manage. There were redundancies in every function, but there were notable inefficiencies

in procurement, management information systems (MIS), inventory control, design, and maintenance.

The seeming advantage of having a fall-back contractor should one fail or be terminated evaporates when tempered with the sure knowledge that the Corps could not afford to have its contractor fail or permit its contracting officer or NEPO commander to terminate a DCC.

Two contractors simply do things differently and seeming inconsistencies were not easily explainable without expending considerable effort. These inconsistencies resulted in many of the problems with MOD and continued to be a major source of Israeli nonconfidence and suspicion.

To prove this point, one only has to recall the episode with MIS differences involving Under Secretary of the Air Force Chayes and its long grueling and acrimonious aftermath which involved USAF auditors and a DAS team in Israel for several intense months.

I recommend with 20-20 hindsight vision that NEPO should have had one constructor; one design contractor (the constructor did not control the design portion of the DCC anyway), which would furnish the procurement for sites and provide quality control; and one contractor to provide logistical support for both sites and for Tel Aviv headquarters. If any professional or technical augmentation was required for the Corps, it should come from the design contractor.

I estimate the three-package concept savings very conservatively at \$50 million. There is no way to estimate indirect costs and management time expended in explaining to the user and to the customer the contractor differences in such areas as estimates,

costs, expenditure rates, accounting, and procurement techniques

12. Obligations follow expenditures. Management of cost contracts must track obligations as the basis for cost management. Cost reporting must be on an obligation base that relates to a work-breakdown structure/chart of accounts tied to the contract budget estimate.

Control of costs will not be possible if this front-end step is avoided or neglected. Actual expenditures must be related to budget elements, unpaid costs, and estimates of remaining obligations -- if these cannot be tied together, cost management will be severely impaired if not impossible.

Productivity analysis must be measurable thru the financial reporting system. Cost of manpower for specific trades must be identifiable and comparable to budgets.

13. Specify the MIS system. There was no requirement for a standard MIS; there must be. The MIS must be responsive to all aspects of management needs: upward reporting, baseline schedules, cost tracking and control, design, and procurement.

We cannot afford to rely on DCC promises to deliver a useable system or to use "their" system; they may prove unresponsive or unreliable.

The one major problem from the beginning and throughout the IAP was the credibility of the MIS. Later problems were the differences between DCC inventory control systems and the lack of an automated system.

14. Organize and manage from the start to control the design-procure-construct disconnect. In the origi-

nal authorizing documents, the management and control structure as well as detailed relationships of the user, customer, and construction agency must be established and agreed on in a great specificity before starting. Once control erodes, it is difficult or impossible to regain.

The construction agency should have a voting member on the Program Configuration Control Board. Without it, engineering change proposals quickly get out of hand. A fixed-price contractor would not allow the user to make unbridled changes; the construction agency must act as the surrogate -- in our case, the DOD Program Management Office was unable to do this.

Avoid letter contracts, which improve the contractor's bargaining position, unless absolutely necessary.

The RFP for CPFF solicitation should include requests for fee and home office G&A proposals. This is essential to avoid protracted negotiation due to lack of contractor definition.

Include an Appendix "i" and do not rely on the work of the contractor to control costs. Task directives are required.

Confidentiality of program amounts must be maintained to ensure competition and fairness to the Government during negotiations. Negotiate in the U.S., not at the job site; settle on the product before we buy.

The design element should be a separate contractor; or if design must be controlled by the DCC, the design firm must be a full member of the consortium. The designer should gear up rapidly enough to do the design, not the host country. Insist on USCE/USAF specifications, if politically feasible. Freeze design when approved for construction except for fatal errors; "fatal" must be rigidly defined and must be

fatal.

Start BOMs immediately and actual procurement at about the 60-percent design level. Stress DAR flexibilities rather than its inflexibilities. Fully utilize options of negotiated procurement.

See paragraph 10.

15. Simplify as much as possible. Although there are rigid laws and rules, there must be some way of cutting through the bureaucracy to get on with the job. When using foreign funds, procedures should not require adherence to US DOD and DA regulations in all instances. This simplification is an absolute must to avoid antiquated relations.

Providing contractors with simplified guidance where possible concerning travel employment agreements, (Termination notice provisions) work requirements will insure full commitment to the project.

16. Get back into the quality control (QC) business. General Morris correctly stated that "long after the airbases are built on time and below budget, all that the customer will readily remember is the quality of the airfield and its facilities."

The DCC, the Area Engineer, and the commander and his staff are overwhelmed with finishing on time -- time is always of the essence at least until the job is done. "Quality is good enough" and "we know what we are doing; leave us alone" are familiar DCC expressions.

See paragraph 10.

It is imperative that the Corps keep continual pressure on and monitor the contractor's QC procedures.

The Corps' quality assurance (QA) functions must be tuned to perform essential monitorship and supervision. Combining QA and QC under Corps control should be carefully reviewed and considered prior to contract formulation.

17. Get more leverage from a management support contractor, if one is needed. Prevent layering and duplication of functions with Corps personnel; provide for and insist on deliverables. Avoid "body shopping." Insist upon technical professionalism in key management positions; the general manager must be an engineer.

18. Begin phase-down/phase-out and closeout planning early. Phase down will be driven by construction progress, but manpower requirements must be continually monitored by the Corps to provide impetus for phase down. Plans should be formulated around flexible milestones and frequently revised and updated as initial uncertainties are eliminated.

19. Have integrated procurement/inventory control systems that will facilitate property transfer during phase down. Property transfer should begin early and be accomplished concurrent with construction. Accurate inventory control is essential to a smooth project closeout.

20. Recruit a good contract-closeout team. Select the contract-closeout location early and begin recruiting the closeout team so that they can go into action while all the knowledgeable players are still in the game. The closeout team can begin to identify and address known contract-closeout issues while construction is still underway.

OVERALL: The construction agency (the Corps), the customer (the USAF), and the contractor must share identical perceptions of productivity and efficiency, quality control, safety, and morale. The prime obstacle to overcome and re-overcome is lack of cooperation. We cannot afford adversary relations. Synergism among all players is key; this goes far beyond organizational efficiency or effectiveness.

- - BG(P) John F. Wall - -
Commander, NEPO

The lessons learned by the construction agency (the Corps) are sorted by program phase:

- Planning/mobilization
- Design and procurement
- Peak construction activity
- Phase down/phase out and planning for closeout
- Recommendations

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"Allow Fire Fighters to Direct Their Water Hoses."

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✓ Put your money where your mouth is

Give the project the necessary priority

Commit best civilian and military people in the proper numbers

- Avoid spending too much time in training people
- Use incentives such as making the military jobs commands and build up key civilian jobs

Make general officer the Project Manager

Allow fire fighter to direct the water hoses

- Have project report as an operating element of OCE
- Give project clear lines to OCE
 - * If OCE makes decisions that affect the mission
 - * If OCE must make decisions to ensure timeliness

✓ Organize and manage from start to control
the design/procure/construct disconnect

In a foreign country, make Project Manager member of U.S. Embassy/Country Team

Consider making Corps Program Manager for DOD to

- Create direct relation with user
- Reduce number of bosses for contractor

User/customer/construction agency relationship

- Establish and agree upon before project starts
- Seek agreement on ground rules for user's participation in project
- Construction agency must
 - * Have complete control at project level
 - * Have sole responsibility and authority to administer contracts
 - * Establish initiative to disapprove selection or to fire any level of contractor's personnel

Program Configuration Control Board

- Have Project Manager (head of construction agency) as voting member to limit number of engineering change proposals (ECPs)
- Have Project Manager representative senior full member (heads of user and customer agencies)

Management and control structures

- Arrive at time and cost goals that the user, customer, and contractor will accept
- Agree with user and customer on reporting details and frequency
 - * Emphasize cost control in dollars and manpower from beginning
 - * Establish budget definitions and requirements (integrate into management control system)
 - * Agree on cost-transfer policies and procedures, incorporate into contract, and apply uniformly
- Tie organization into management control system
 - * Ensure all related elements have defined responsibility for system interface
 - * Design all interfaces to produce defined benefits to organizational elements
- Establish and agree on task directive proposals by contractor

NOTE: For the IAP, the user was the Israel Ministry of Defense; the customer was the U.S. Air Force; and the construction agency was the Corps of Engineers.

- ✓ Have management team prepare Requests for Proposals (RFPs) with scopes of work that include prime mandatory requirements necessary for program management to use in selection considerations

If design is controlled by construction contractor (as was intended for NEPO)

- Have design element as full member of the consortium
- Require demonstrated experience in Government procurement procedures
- Specify the following if project is OCONUS
 - * Demonstrated experience in procurement logistics
 - * Cost/production experience data for pre-dominant work-force nationality
 - * Ability to establish and maintain in-country management control system
- Require commitment of organization and managers by name dedicated for term of contract and write employee contracts to ensure this happens
 - * Include requirement for general staffing plan to be approved by the Corps

- * Must plan to bring competent QC resources on board early in sufficient numbers and time-phased to match increases in construction forces

- Define internal audit requirements

If management and life support contractors are required

- Commit fully and specify deliverables (task directives)
- Require professionals in key positions
 - * Identified by name and qualifications with general manager an engineer
 - * Committed for term of project
- Recognize that DCCs are not experts in hotel management/life support any more that life support contractors are design/construct managers
- Realize that alternative is to staff with Corps personnel, which probably will not be readily available

NOTE: Alternative three-package concept is given on the following page.

Consider three-package concept for fast-track construction projects

- Have one design contractor and one constructor for all sites and one logistical support contractor for field and headquarters. This will
 - * Cash in on economics of scale
 - * Simplify management
 - * Improve user/customer/construction agency relationships
- Include any professional or technical augmentation needed by Corps in the design contract
- See item 11 in the EXECUTIVE OVERVIEW for the background discussion of this alternative

✓ Define management control system (budget-schedule-progress-cost integration)

Require Corps/industry state-of-the-art system with essential technical expertise

Design system to provide cost/schedule/finance control required by user, customer, and construction agency

- Must be responsive to all aspects of management needs
 - * Upward reporting
 - * Baseline schedules
 - * Cost tracking or control (dollars and manpower)
 - * Design
 - * Inventory control and tracking (subsystem cost interface)
- Describe management control system requirements in detail

System specifications

- Specify manageable level of detail
- Define
 - * Process/form of management review
 - * Elements for real-time management
- Appreciate that up-front expenditures on system are essential

(Continued)

System specifications (continued)

- Require specific system hardware selection as initial decision (must rely on Corps planning and preparation)
 - * Specify user interfaces
 - * Define system interfaces if required between DCC's and Corps' systems
- Specify work-breakdown structure for estimating, budgeting, scheduling, direct manpower requirements by craft, progress reports, and cost-control needs
- Ensure simple input (preformatted) and flexible with predefined outputs
 - * Require input/output by terminal in system user's office/work area
 - * Identify printout sorts desired at whatever time intervals considered necessary
- Have capability to make what-if analyses with schedule, crewing, and obligation vs funds flow at construction agency/contract management level

CAUTION: Do not rely on DCC's promises to deliver a useable system and do not allow use of "their" system that may or may not be responsive or reliable.

Require work-breakdown structure/chart of accounts to control costs

- Relate actual expenditures to
 - * Budget elements
 - * Unpaid costs
 - * Estimates of remaining obligations

- Have responsive financial reporting system
 - * Measure and analyze productivity
 - * Identify cost of manpower for specific trades and compare to budgets

EXPENDITURE-OBLIGATION ANALYSIS FOR ISRAELI AIRBASE PROGRAM					
Estimate to Complete Ovdv Airbase as of 30 April 1982					
\$ Millions					
Budget Elements	Actual Expended	Accruals and Unliquidated Obligations	Current Obligations	Remaining Obligations	Total Requirement
Labor		Unpaid April Labor Accrued Burden	3.0 2.6		
	127.8		5.6	133.4	4.3
Life Support		Food Service	0.1		
Materials		Portland Cement Asphalt Open Purchase Orders	0.1 0.4 0.8		
	107.3		1.3	108.6	0.3
Capital	63.9	Rental (Open POs)	0.2	64.1	0.1
Transportation	22.0	Estimated Obligations	0.1	22.1	0.1
Miscellaneous		Open Purchase Orders	0.4		
SUBTOTAL	399.2		11.3	431.5	6.5
Fee	32.5		0.5	33.0	1.3
Total Obligations	452.7		11.8	464.5	7.5
Contract Closeout					1.1
Total Requirement					473.1

Note: Exemplary only; entries are not complete.

- ✓ Have management team select contract type and contractor and develop Government estimates for negotiations

Select type of contract appropriate for project-specific constraints

- Avoid letter contracts whenever possible
 - * Include cost controls
 - * Use specific task directives
- Use fixed-price contracts when practical
- Consider cost-type contracts in following order of precedence
 - * Cost plus incentive fee
 - * Cost plus award fee
 - * Cost plus fixed fee (including incentive payments for critical elements)
- Provide for converting a cost-type contract to a fixed-price contract if conditions that led to use of cost type cease to exist
- Consider combining multiple projects into a "package deal" if there is more than one project in program

Select contractor

- Use checklist to compare prospective contractors (give weight to prime mandatory requirements)

(Continued)

Select contractor (continued)

- Emphasize business, administrative, and logistical skills as well as engineering and construction know-how
- Consider each applicant's present capacity and those assets that will be dedicated to the project

Negotiate terms of contract

- Do not allow user to manage or enter negotiations
- Keep program amounts confidential during negotiations
- Maintain maximum competition possible
- Negotiate within scope of work to get contractor able to comply with requirements of contract in manner expected by the Corps
- Retain consultants if Corps expertise is not available to review the following
 - * Minimum job standards
 - * Equipment needs
 - * Contractor's logistical organization

(Continued)

Negotiate terms of contract (continued)

- **Have explicit criteria, definitions, and entitlements in employment contracts**
- **Reduce fee if guidance is provided for preparation of policies and procedures manual (see RECOMMENDATIONS)**
 - * **Require basic manual for Corps approval in time to influence action from outset to**
 - **Lower cost**
 - **Improve management efficiency**
 - **Avoid misunderstandings between Corps and contractor**
 - * **Consider incentive payments to encourage contractor to develop and refine manual based on project experience**
- **Negotiate in the U.S., not at the job site**
- **Settle on product before you buy**

✓ Staff key positions carefully and for the duration of the project or until no longer needed

Construction agency

- Have fast-track cadre (permanent persons when possible) to participate in all actions until permanent individuals are on board
- Allow Project Manager to select his key people
 - * Select 8 to 10 good people as a nucleus to build around
 - * Recruit the best people
 - * Ensure personnel system is fully supporting recruiting effort (high priority)
 - * Build organization around individuals who owe their loyalty to the on-the-job commander
- Consider tempering military sharpness with tried civilian managerial competence
 - * Officer Project Manager/civilian deputy
 - * Officer Area Engineer/civilian deputy
- Bring key staff on board at headquarters early
 - * Committed for duration of project
 - * Participate in project planning, personnel selection, and contract preparation
 - * Deploy to the project already working together as a team

- Develop time-phased general staffing plan
 - * Make fully qualified hires at pace based on staffing plan
 - * Identify positions necessary for institutional memory or for life of project for other reasons
 - * Establish accompanied status where necessary to ensure continuity
 - * Include experienced personnel necessary for proper administration and surveillance of contractor's activities

NOTE: Key civilian staff includes the Deputy Project Manager; Deputy Area Engineer; Chiefs of Engineering, Construction, Resource Management Office, and Purchasing and Contracting; and Legal, Personnel, Safety, and Transportation Officers.

Contractor

- Require senior management personnel to be part of contractor's permanent staff (at least a VP and a "comer" should be on the job)
- Have contractors submit resumes of persons proposed for key positions and operating officials for Corps approval
 - * Organization chart with persons and positions identified
 - * Persons committed for full time positions are required to complete project
- Obtain plan for phased staffing of effective key positions down thru
 - * Superintendents
 - * Second- and third-tier managers
- Hold contractor to an approved general staffing plan
 - * Ensure slow start and then crescendo
 - * Avoid expensive inefficient early hires
- Require experienced personnel in all positions of foremen and above
- Specify labor contracts that have procedures to allow short termination periods for laborers
 - * Long 30-day notices result in periods of inefficiency
 - * Highly desirable alternative would be 1-week notice with 2-weeks severance pay
- Carefully review and periodically monitor personnel policies for agreement with contract
 - * Specify exactly the basis for payment of wages and benefits (classes of air travel, Fly American, TDY, etc.)
 - * Analyze special entitlements for compliance with intent and spirit of contract
 - * Monitor labor relations to ensure frugality of benefits, efficient hiring and firing, and adherence to job qualification requirements
 - * Dedicate position for position and pay specialist in Area Office Resource Management Office to accomplish the above
- Establish policy on contractor use of Government owned vehicles and enforce rigidly
 - * No private or unauthorized use of administrative vehicles

EXAMPLE: Superintendents cannot have pickup trucks for personal use as they would have with contractor-owned vehicles.

 - * Specific policy on recreational use of vehicles
 - Payment for fuel and repair of damages
 - Equal access for all employees
- Keep key people overseas until detailed first cut at contract closeout is accomplished

✓ Establish standard workweek that balances need to attract qualified personnel with basic cost/time considerations of productivity

Ensure judicious allocation and management of overtime work

- Agree with contractor on standard workweek during contract negotiations
- Give contractor management authority to approve specified maximum excess amounts of overtime (1-3%) in unusual short-term situations

Verify standard workweek in consideration of onsite conditions

- Specify ground rules at the outset
- Avoid reducing allocated overtime, which will affect employee morale and cause productivity to drop
- Identify contractor and Corps personnel who must work on same schedule

Consider system of time-related incentives (would require regulatory relief)

- Have contractor establish system of incentives for work in excess of upper limit of normal production standard -- piecework salary incentives
- Get Contracting Officer's approval

EXAMPLE: Allow contractor to pay certain crews rate earned for standard workday established for the project if they complete amount of work in excess of upper limit of normal production standard established by the contractor and approved by Contractor in less than the standard time.

✓ You can't play safety catchup if substandard equipment is procured

Define safety standards in the RFP and the contract

- Personnel
- Hardware and personal protective equipment
- Establish minimum equipment-maintenance program
- Dictate accident-reporting system with specified time limits
 - * Identify reporting channels and details such as forms, etc.
 - * Document penalties, liability, and other consequences

Make a professional Safety Officer with an engineering/construction background an early Corps hire to

- Assist in procurement of recreational and administrative vehicles that meet Department of Transportation standards
- Monitor contractor's safety program, operating procedures, and equipment
- Institute safety programs such as defensive driver training adapted for in-country legal and road conditions
- Sponsor basic 200-word second-language training if necessary for workers to read operating and safety instructions for equipment, tools, and vehicles

✓ Effective security and investigative support should be available at start of project

Address authority and jurisdiction issues in Country-to-Country or Status of Forces Agreement

- Determine Justice Department involvement in criminal prosecution of American citizens arrested in host country
- Advise employees of host country police and customs authority before deployment

Make security a separate prime contract with Corps Chief, Security/Provost Marshal as Contract Officer

- Have contract security elements directly controlled and supervised by Corps Chief, Security/Provost Marshal
- Ascertain all security actions performed in accordance with Corps security requirements

Have design/construct contract stipulate security program if needed to safeguard classified documents

- Authorize a supervisory agent
- Specify penalties for failure to comply with control and safeguard regulations

Ensure both security and investigative support units are in place prior to project initiation

- Make Chief, Security/Provost Marshal a Special Staff Officer reporting directly to Project Manager or his deputy
- Include Physical Security/Crime Prevention Specialist in organizational planning

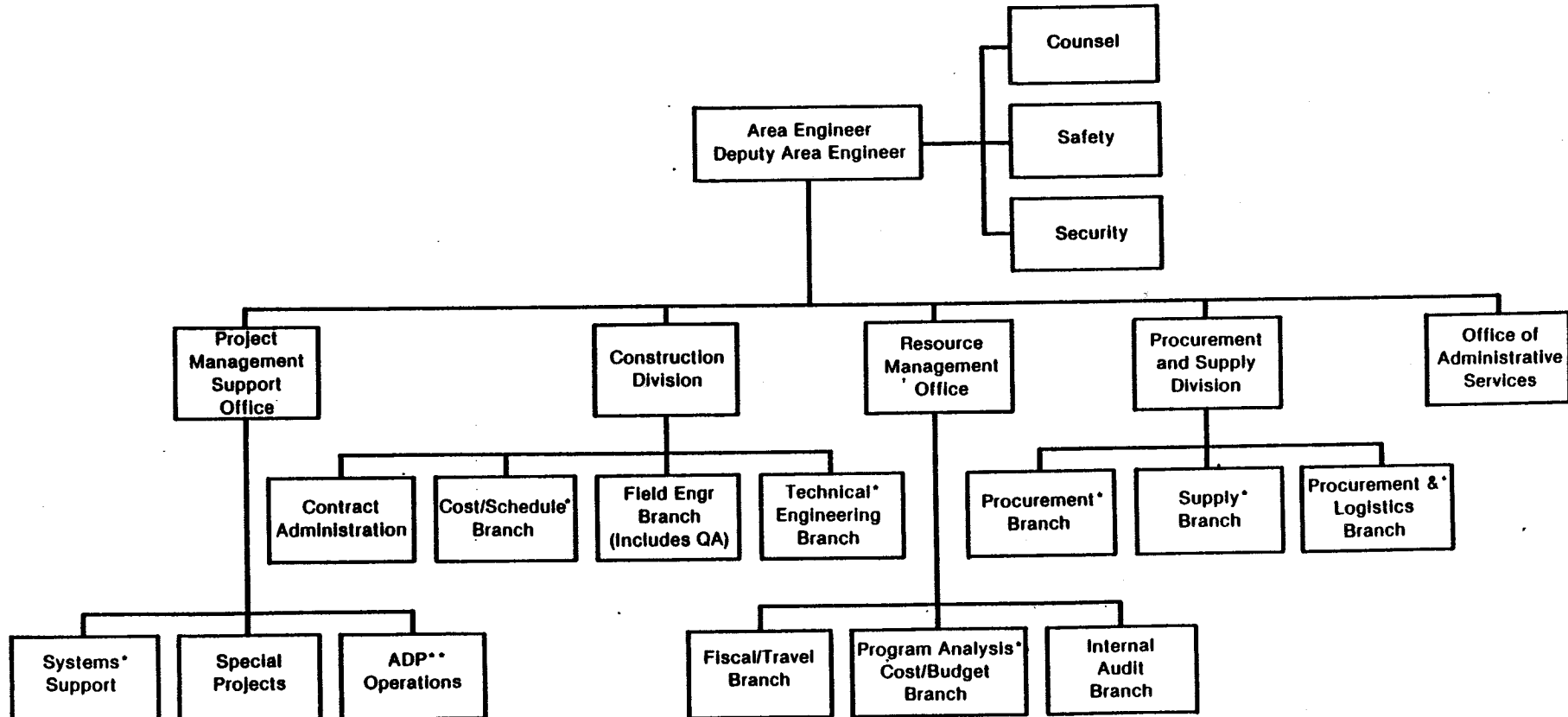
Bring military police investigators (MPIs) onto team from beginning of project

- Retain same MPIs for term of project
- Define MPIs' authority and provide proper support
- Have MPIs report directly to the Provost Marshal

Determine if in-country conditions make it prudent to arm security/investigative personnel

- Gauge possibility of life-threatening situations
- Evaluate increase of terrorist activities and need to protect commander, VIPs, and dignitaries
- Increase personal security and counterterrorist training for personnel

✓ Consider using a functional organizational structure at Area Office to support the fast-track time/quality/cost concept



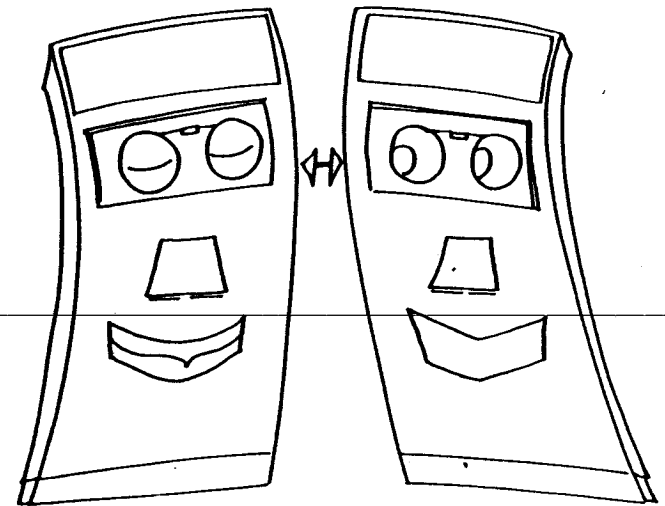
**Can Be Corps System or Contractor Operated

Note: This suggested structure would be consistent with establishing a field organization led by a colonel that relates to a Corps District. The Project Management Division is considered an

essential element to ensure and coordinate the use of a systems approach in the Area Office's operations. The asterisks mark the organizations that should fully utilize systems for their functions.

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✓ Require an integrated design engineering/construction engineering effort

Manage the design/procure/construct interface

- Simplify as much as possible
 - * Find ways to cut thru bureaucracy at beginning to get on with the job
 - * Emphasize strengths of system, not weaknesses
- Get contractor to recognize and manage interface thru use of management control system
- Ensure that Corps systems are used to tie related planning and scheduling together
 - * Include project management/system support function (see suggested organization chart on page 16)
 - * Recognize the coordination of separate functions thru single system is essential

Define scope and manpower requirements for design prior to commencement of design activity

- Have scope that covers manhour estimates and projections for submittal of drawings, specs, and BOMs (consider procurement and early construction needs)
- Match manning requirements (disciplines, duration, etc.) with projected manhours for preparation of design documents

Identify constructability problems and propose necessary design changes based on knowledge of construction techniques

Provide incentives to have DCC gear up rapidly enough to do the design

- Require designer to provide in-country liaison design and stateside design support
- Use U.S. specifications and criteria

EXCEPTION: Local subcontractors who would normally use familiar local specifications

- Design with economical materials for construction location
- Be aware of user requirements to operate and maintain standard U.S. systems
- Specify test methods and reporting procedures for QC
- Freeze design approved for construction except for rigidly defined "fatal errors" that must be fatal to the purpose for which the facility is intended

Make maximum use of steel or precast preengineered buildings or components

- Make decisions early and order standard items
- Identify, design, and order other items as design progresses

Sell DCC on Corps' perception of QC/QA effort

- Strengthen contractor QC requirements
- Keep continual pressure on contractor and closely monitor QC procedures
- Put monetary teeth in penalties for failure to meet QC specifications

Consider having Corps responsible for QC and QA

- Tune functions for essential monitorship and supervision
- Review merits of combining QC and QA under Corps control prior to contract formulation
 - * Save money
 - * Conserve manpower

✓ Use fast-track procurement methods and tie procurement to the construction schedule

Centralize and coordinate procurement functions

- Require designer to provide BOMs early
- Establish close coordination between personnel responsible for engineering, preparation of BOMs, and construction (material requirements) and procurement personnel (purchase orders)

NOTE: This coordination assumes even greater importance when design is done at a central location and procurement is managed from a remote site.

- Establish achievable and time-phased procurement goals
- Make full use of options of negotiated procurement

Determine documentation required for customs clearance and movement restrictions of duty-free project materiel

- Train procurement and purchasing personnel
- Instruct vendors and suppliers accordingly

Require integrated procurement/inventory control systems

- Modern and flexible
- Have expert (consultant if necessary) validate systems and integration
- Anticipate use in expediting property transfers during phase down/phase out

Staff Procurement early with quality and quantity people and move out!

- Start BOMs immediately and actual procurement at 60-percent design level
- Identify critical long-lead-time items and procure early
- Stress DAR flexibilities rather than inflexibilities

Meet DAR norms for purchasing methods

- Require contractor to maintain cost-analysis capability
- Monitor DCC to ensure purchases are made at fair and reasonable prices

Define and monitor scope of O&M documentation

- Tailor extent and level to meet the minimum requirements of user
- Start implementation of O&M scope with initiation of procurement
 - * Obtain vendor data with equipment and file properly
 - * Mark up as-built drawings and prepare contractor's shop-drawing index simultaneously with construction activities

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✓ If you err (and you will), err on the side of conservative time estimates

Make frequent expenditure and manpower projections

- Manage by crew
- Require detailed analyses of trade-mix requirements
- Capture direct and indirect expenditures
- Get reasons for any undistributed labor charges

Have small top-flight control teams to check projections

- Set up 3- to 5-man groups
- Use bright young tigers (military and civilian), not wild-assed guys who might be misled or intimidated

Have contractor redevelop labor requirements at regular intervals

- Get match of crew size and job assignments
- Make coordination of crew assignments for size and tasks a specific responsibility and then monitor effectiveness

Include contractor in monthly scheduling sessions

- Go thru drawings and materials and labor lists and make real-world assumptions
- Use assumptions to develop plans
 - * Play what if -- Pay more money or more time? Squeeze time intervals? Who gets hurt?
 - * Encourage contractor to refine plans

- Establish firm start/finish dates
- Keep scheduling displays basic and usable -- sequenced bar charts first based upon networks as required (both overall crewing and construction logic by facility)

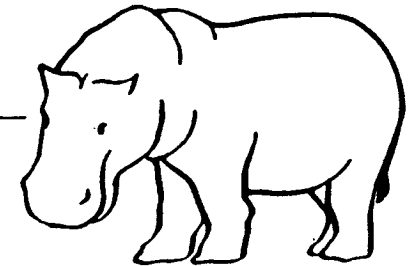
Bring in contractor's controlling partners for periodic reviews

- What's good? What's bad?
- Identify top policy items to zero in on

Begin early to plan on how to end the job



✓ Don't stand between the hippos and the water



Keep the situation fluid and don't fail to meet objectives either thru over optimism or (worse) thru pessimism

- Establish realistic schedules that are acceptable to the contractor and that meet the requirements of the user
- Make certain that the contractor appreciates the importance of meeting or beating the schedule
 - * Use projected vs actual progress to determine when schedule compression will be necessary
 - * Use best crews on critical items
- Carefully evaluate impact of compressing the schedule for or shifting crews to one facility on the completion dates of other facilities (i.e., the bow-wave effect)

Control cost-growth proposals

- Do not permit user to stretch definition of fatal error to obtain unilateral approval of some ECPs
- Work diligently to minimize ECPs to avoid cost growth and instability in the project

Devote special management attention to turnover of equipment and facilities as rapidly as situation will permit in order to

- Avoid expenditures to safeguard equipment
- Minimize manpower and time consumed in repairing damage caused during activation and move-in

Cost vs schedule vs manpower is a tough tightrope

- Require frequent regular in-depth reviews of cost to date, forecast final cost, and completion schedules
 - * Evaluate progress and contractor's estimate for completion thru comparison with independent manpower analysis and financial projections
 - * Beware bow-wave effects of facilities not completed on schedule
 - * Continually build an audit bridge between original and current budgets
 - * Use original and updated project control estimates to monitor Area Engineer's financial management

(Continued)

Cost vs schedule vs manpower (continued)

- Nail down manpower and trade mix needed to meet schedule
 - * Make real-world schedules in cooperation with user
 - * Manage by crew
- Resist redefinition of end points by user
 - * Establish as fact that completion objective dates (CODs) are best-effort estimates, not actual completion dates
 - * Manage to earlier target objective dates than are known to be immediately obtainable to give a better chance of meeting CODs
- Expect pressures to throw in more manpower when a COD is in jeopardy
 - * Evaluate level of production hurt by intensified efforts to complete facility to meet user requirements
 - * Verify user's current requirements for facility and ability to move in on the specified date
 - * Avoid accelerating procurement and construction if user cannot move into facility for any reason
 - * Avoid expensive, inefficient overtime except when absolutely necessary (six 10-hour days may be too much anyway)

Promote cooperation between headquarters and the construction site

- Have headquarters limit requests for information
 - * Structure standard reports to eliminate all but miscellaneous requests
 - * Appreciate pressures and demands on field office in a fast-track situation
- Keep site personnel flexible to respond to the headquarters needs
 - * Respect upward-reporting requirements
 - * Determine if informal reporting (with or without followup) is adequate

✓ Inefficiencies will occur if joint occupancy of the project by user and construction agency is required (e.g., when construction site is also an airfield)

In early stages of the project establish realistic turnover dates that

- Can be accomplished by the construction agency
- Are acceptable to the user and the customer
- Are kept current as construction progresses

Look for tradeoffs between construction efficiency and activation requirements

Evaluate impacts of site activation, schedule work-arounds, systems testing, and start-up procedures on construction schedules

- Determine pressures created on progress rates
- Limit competition for manpower resources
- Consider ripple effects of actions on other crafts and progress on other facilities

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● Begin to address issues prior to construction completion	



✓ Know where you are along the path

Intensify surveillance of remaining work force/work

- Release nonproductive workers
- Monitor productivity in specific detail
- Ensure all material and supplies and required equipment are available

Plan for contract closeout

- Identify personnel for contract-closeout organization
- Organize along the team concept: everyone is a specialist but is ready to assist the others as required

Ensure needed skills and talents of Corps' work force are retained to finish project

- Plan orderly and effective drawdown
- Involve authority to waive bump and retreat rights within subgroups
 - * Eliminate employee displacement (no bumping)
 - * Plan end-of-project leave for key persons so that they are available when required
- Set up Positive Outplacement Program well in advance of phase down/phase out
 - * Coordinate with CONUS
 - * Keep work force informed and reassured

✓ Plans for closeout are driven by construction progress
and construction requirements

Planning for closeout of the project should begin early
(for NEPO, 18 months before construction completion)

- Use time-phased planning driven by construction progress for
 - * Property transfer and demobilization
 - * Contract closeout
 - * Administrative closeout
- Have flexible plans with milestones for decision points

Provide impetus for manpower phase down, which must come from the Corps, not the contractor

- Driven by construction requirements
 - * Match crew size to task requirements
 - * Devote intensive management effort to ensure high productivity
- Phase out unneeded skills
- Have Corps Transportation Officer monitor transportation arrangements of phased-out personnel

Examine manpower phase-down plans monthly and revise as construction requirements dictate

- Maintain continuous pressure on the contractor to ensure compliance with approved plans
- Display both indirect and direct labor requirements by months at Corps' project headquarters
 - * Actual
 - * Projected

Match manpower phase down closely to life support requirements (including food and housing)

- Control Class I supplies (food and commissary items) carefully
- Ensure that the pipeline is turned off at proper time to eliminate or minimize excess stores
- Establish cross-transfer procedures to minimize excesses and eliminate unnecessary procurements

✓ Contract-closeout duration will be driven by the complexity of the issues that remain unresolved at construction completion

Use integrated procurement/inventory control system for property transfer

- Establish proper transfer procedures early during construction
- Make transfers concurrent with construction
- Emphasize accurate inventory control throughout the project

NOTE: This is the key element for effective property transfer in the final stages of the project.

Make selection of location for contract closeout (CONUS vs in-country)

- Use cost analysis as a major factor
- Determine early in project

Recruit good closeout team

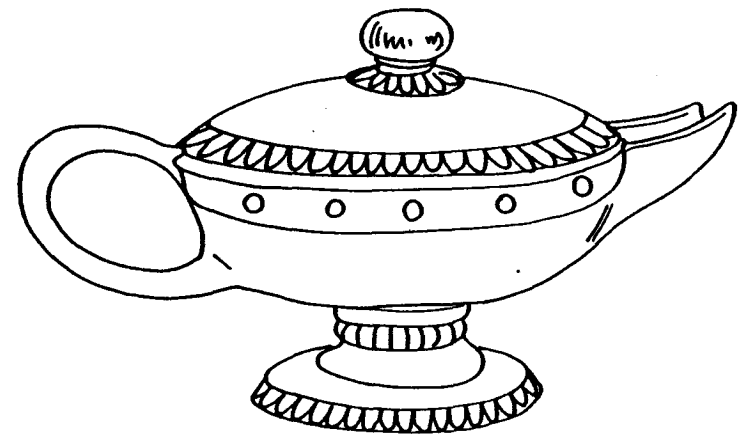
- Select early
- Resolve uncertainty of closeout duration when possible
- Establish reemployment rights and priority placement guarantees to attract and retain quality people

Begin to address issues prior to construction completion while all the knowledgeable players are still in the game. Issues will include

- Contract administration
- Property inventory and transfer of equipment

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RECOMMENDATIONS

✓ Initiate research to develop the following:

- Management control system

A system should be developed that is responsive on a near real-time basis from the beginning of a project. It should not only track what is going on but should also be designed to produce the facts early enough to influence the action. Data and information should be accessible so that evaluation of progress and costs could be related to plans and budgets.

The system should include both the hardware (a mini computer with interactive capability) and a relatable work-breakdown structure that could be tailored for special projects -- construction of airfields; rapid deployment bases, or locks and dams in a foreign country as well as construction projects in remote locations in the U.S. The package should include a set of DAR specifications for a cost-plus or a fixed-price contract.

The objective of having the system is to require a contractor to comply with a specific set of starting rules so that his cost and construction planning and activities are integrated and can be monitored and evaluated in a manner contributing to better project management.

- Guidelines for facility planning and design for a temporary construction camp

Guidelines should be developed for the construction and erection of a temporary construction camp at remote locations, together with office and life support

facilities, and including layout and design of site utilities. The objective would be to begin layout and construction of utilities concurrent with competitive procurement and shipment of prefab housing and support facilities from applicable suppliers.

- Standard lists of construction materials

Standard lists of construction materials should be developed for typically sized facilities based on available material resources for various climatic conditions locations, and shipment methods. Guides should be included as to feasible alternative materials based on site conditions and locations. The list could be used to initiate early procurement and construction before completion of design.

- Model contractor's policies and procedures manual (PPM)

A model PPM should be developed and furnished as a guide for any DCC for a fast-track cost-plus project for use in developing a project-specific manual. The model manual should be flexible enough to be of use to a full range of contractors from one who has few if any recorded policies and procedures to the one who already has much of the input for a PPM.

Availability of the model PPM plus the PPMs of the NEPO contractors (see page 32) would make it possible to have a project PPM approved and in effect early in a construction program. The help provided would be considered in negotiating a reduced fee.

✓ Develop cost-plus contract training program

The IAP showed that both the military and civilian components of the Corps have experience gaps in cost-plus contracting. This should be addressed by OCE-sponsored training that would be required for eligibility for assignment to cost-plus projects.

✓ Avoid reinventing the wheel by retaining NEPO contractors' policies and procedures manuals for future reference

This would capture the problems solved and the procedures developed by the contractors. These documents are too voluminous for routine printing and distribution. If they are required for contract negotiations, copies can be purchased for the cost of reproduction. Requests should be addressed as follows:

Commander and Director
Attn: EIAC/EL
U.S. Army Engineer Waterways
Experiment Station
P. O. Box 631
Vicksburg, MS 39180

NEPO Information

Air Base Constructors*, "Integrated Management Plan, Ramon Air Base, Israel," Internal Working Document EL-82-7, May 1982, on file at the U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss., for the Near East Project Office, Tel Aviv, Israel.

Negev Airbase Constructors**, "Policies and Procedures for Construction of Ovda Airbase, Israel," Internal Working Document EL-82-8 (Volumes I-VI), May 1982, on file at the U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss., for the Near East Project Office, Tel Aviv, Israel.

* Guy F. Atkinson Company, Dillingham Corporation, and Nello L. Teer Company, in association with Air Base Consultants.

** Perini Corporation, Harbert Construction Corporation, Paul N. Howard Company, and Louis Berger International, Inc.