

CHAPTER 11

Construction Management June–December 1980

We have situations where construction is constructing, design is still designing, and procurement is caught in the middle, lots of them.

Brig. Gen. Paul T. Hartung¹

It is not a complicated job. It's just a hell of a lot of it.

Otis Grafa, Chief, Construction Branch, Ovda Area Office²

During the last half of 1980 the project showed signs of its evolutionary character at Ramon and Ovda as well as in Tel Aviv. Wall arrived at a time of transition at both sites. Morris had set the tour of duty for the area engineers at twelve months, much to the chagrin of General Lewis. He thought Morris played down the role of the area engineers and wanted the commanders at the sites to remain for the duration.³ With Curl and O'Shei finishing their stints and returning home in the spring, both sites experienced some instability during the summer. At Ramon the change of command was straightforward, with Col. Paul W. Taylor arriving in June to take over from O'Shei. Taylor stayed one year before a new area engineer replaced him. At Ovda the transfer turned out to be more complicated.

After Curl's departure, Col. Robert K. Tener took over the area office. Tener had been thinking about coming to Israel since the beginning of the year. With his tour as district engineer in Nashville ending, he considered the prospects for his next assignment. "What the hell," he wondered, "can a District Engineer do that's onward and upward?" When he saw the choices, he knew that none better fit his qualifications and ambitions than did the air base project. So he felt drawn to the work in Israel, both because of a strong sense of duty and for the chance to see the Negev and the Middle East. As he put it, "I was eager to do a good job where I knew I fit." Still, the decision was not an easy one. Like other officers his age, Tener had children in school. More impor-

tant, his wife was disabled with multiple sclerosis. He faced a difficult struggle between duty and his family.⁴

Tener's situation contrasted markedly with that of fellow officers who avoided assignment to Israel. At least one threatened to retire rather than join the project.⁵ The lack of interest surprised Wall. He thought that "for a hot-shot colonel," the project represented "the best chance to make general officer."⁶ Wall believed many excellent colonels in the Corps were capable of taking major roles in the project. According to him, the situation required the chief of engineers to say, "You are going, Colonel X, you are going. If you don't like that, retire." But, Wall concluded, "He hasn't said that."⁷ Morris would have agreed with Wall that the project represented an opportunity for energetic officers interested in advancement. His own criteria for measuring the suitability of officers for promotion emphasized their responses to the opportunity for failure. However, while he admired those who successfully handled high-risk missions, he felt that because officer assignments were made at the Pentagon and not in the Corps of Engineers he lacked sufficient control to insist that specific colonels go.⁸

The unwillingness of some officers to take on the challenges in Israel and the inability of Morris to insist that they do so shocked other participants, including Lewis and McNeely. "It was," McNeely said, "the first time I ever heard that you couldn't direct an O-6 [colonel] into an assignment."⁹ In fact, if anyone had solid reasons to avoid the project, it was Tener. Nevertheless, he and his family decided that they could do it, particularly if they went to Ramon. His family could live in Beersheva, which had excellent medical facilities. In the middle of May Tener received a letter from Jack Clifton welcoming him to Ramon.¹⁰

A few days later Tener learned he was going to Ovda. This news revived the just-resolved dilemma. He even drafted a letter to Lewis, asking for relief from the assignment, but did not send it.¹¹ Wall pleaded with Tener "for the good of the project" to "handle that damned alligator at Ovda." He needed "a tough son of a bitch with tough contracting officer experience" and urged him to "please get your ass over here soon."¹² It was the kind of appeal Tener could not resist. He would house his wife and tenth-grader in Tel Aviv and commute between the city and the job site on weekends.¹³

Tener came to Israel during the first week of July. Impatient to start, he stayed in Tel Aviv only a few days before going to the desert. Curl was already gone when Tener arrived, and Deputy Area Engineer Blake was in charge. Tener found that a lack of cooperation prevailed in both Tel Aviv and Ovda. "The signs of poor teamwork were clear and unmistakable," particularly the "distrust

and backbiting” between the Tel Aviv staff and the area office. Much fence-mending needed to be done. A sense of teamwork was also missing from relations between the area office and the contractor. Tener considered this less serious, because some distance had to be preserved in this relationship. Still, the distrust and lack of credibility were evident. Part of this problem may have stemmed from lack of a well-defined Corps position on dealing with the Perini organization. Tener saw that Wall and Lewis disagreed in their assessment of the contractor. Lewis considered the consortium motivated and manageable; Wall pushed for close and constant scrutiny of the contractor. So the first order of business was creating an environment in which Negev Airbase Constructors, the area office, and Tel Aviv worked as a team.¹⁴

Tener never got the opportunity to take on the challenge. He had been in Israel less than two weeks when his teenage son back home became seriously ill. The crisis forced him to leave, and Blake again took over. Tener at least felt confident that he was leaving the job in good hands.¹⁵

Blake's presence gave stability to the situation. With the departures of Curl and then Tener and the recent turnover in management of the contractor organization, some continuity was important. Civilian deputies had arrived at both sites earlier in the spring, much to Hartung's delight. Pete Peterson went to Ramon as deputy for administration; Clifton stayed on as deputy for operations. Blake was the only deputy at Ovda, although Peterson joined him briefly to provide help pending the arrival of a new area engineer. Like Col. Patrick J. Kelly, who replaced Tener in September and agreed to stay for the duration of the program, both Blake and Peterson came to Israel from Huntsville Division. They had experience on many major construction jobs and had worked together on the Department of Energy's strategic petroleum reserve program.¹⁶

Blake, who came to Ovda shortly after the departure of Colonel Miller, differed from the easy-going Peterson. Stern and acerbic, Blake had no patience with the Near East Project Office staff or the niceties of the chain of command. He had little tolerance for foolishness and complained that the better pay and benefits in Saudi Arabia kept many of the best Corps employees from coming to Israel. Wall credited Blake with “a purely fantastic job, a fabulous job.” He had Wall's ear as well as his respect and sometimes went straight to the top, avoiding his own boss and the Tel Aviv staff to do so.¹⁷

O'Shei and Curl had resisted establishment of civilian deputy positions. Curl criticized his civilian staff as “a bunch of really less than competent people.” He attributed the situation in part to a



Management camp at Onda

lack of incentives for overseas work; often the best people did not want to leave the United States. In addition, he found that excellent credentials did not always reflect reality. "Some of the documents that I reviewed," he said, "indicated the person was quite stable and sane and competent, and how those supervisors ever could have rated that person that way was a mystery." On the other hand, he insisted that his "green suiters," Colonel Miller and Capt. Louis Wenick and Robert T. Roberts, played critical roles in getting the project under way. Miller in particular was "a doer," although his lack of tact alienated the Israelis and eventually prompted Lewis to send him back to the States. "If my whole staff had been the quality of those guys," Curl claimed, "I'd have had no problems at all."¹⁸

Colonel Taylor, who came to Ramon in June 1980, was concerned more with continuity and stability than starting the job. He thought each area engineer should have had a civilian deputy from the outset. However, he understood the importance of the officers who had worked for Curl. Mobilizing a flexible and responsive civilian work force on short notice was harder than starting a project with soldiers.¹⁹ Up to certain levels at least, soldiers went where they were needed and did as they were told.

By the end of the summer of 1980 the major changes at the area offices seemed over. Taylor and Peterson were on board at Ramon, where Butler remained in charge for the contractor. Kelly and Blake headed the Ovda Area Office, and the contractor had made numerous changes at the top. New general manager Irving Davis, a veteran of cost-plus projects in Saudi Arabia, quickly won the respect of Hartung and Wall.²⁰ All in all, the prospects for stability in both government and contractor management seemed very good.

Given the size and political implications of the job at each site, continuity was important. The area engineer and his deputy directed the construction project, approved expenditures, and stood between the contractor and higher headquarters, from whence came constant demands for reports and information. All of them used frequent meetings and regular site tours to keep up with their swiftly evolving projects. Blake started his day in a four-wheel-drive vehicle, touring the work site alone before he talked with his immediate staff. Both area offices also used project engineers who managed specific aspects of the job. Some of these were civilian engineers; others were Corps of Engineers captains. In the spring of 1980 only eight project engineers worked at the two sites. They monitored selected facilities, keeping track of progress and potential problem areas.²¹

The methods used by the area offices to manage the contractors sparked considerable discussion. Task directives, which formed the basis for operation of the Management Support Associates contract, were used only to a limited extent for the other contracts. Hartung thought the key was control of resources, which evolved in the spring and summer of 1980 with the establishment of construction and activation schedules and the application of resources to the schedule, particularly by coordinating procurement with the timetables. Later, Hartung claimed that the Corps lost much of its control because it too readily approved contractor expenditures.²²

The main focus of disagreement involved neither task directives nor allocation of resources. Instead, the use of disallowance of contractor expenditures—refusal by the government to reimburse the contractors for outlays that were deemed irresponsible or unnecessary—sparked the most controversy. Discussion of disallowances began early and increased in frequency as audits appeared. Wall's chief counsel noted several obstacles to extensive use of nonreimbursement. Documentation of such action, for which the burden of proof was on the government, was costly in terms of time and money. Moreover, contractors knew from experience of their favorable odds in a courtroom. Although they acted concerned, attorney Brown believed they were not intimidated by the threat. Occasional use of disallowance showed that the govern-

ment paid attention but provided little benefit beyond that. Although Hartung was less than satisfied with the way the Corps managed the contractors, he agreed that extensive use of this tool was unproductive. Hartung understood that the contractor could respond by becoming extremely cautious and slowing down the project, endangering the schedule and bringing even higher costs. So he advocated conservative and selective use of this measure. Wall agreed with his attorney and preferred to resort to disallowance in cases of repetitive incompetence and then only as a preliminary measure prior to dismissing the responsible employees. The Israelis, in line with their concern about the cost of the project, disagreed. They considered the American attitude too permissive and wanted more disallowances.²³

With the need to protect the government's interest on one hand and the requirement to keep the work moving on the other, the contracting officers walked a tightrope. Rigid management could reduce contractor initiative and create incentives for excessive caution. At the same time, inadequate control might result in unnecessary expense. For Hartung, resolving this dilemma required transfer of contracting officer authority from the sites to Tel Aviv. "The delegation," he said, "of contracting officer responsibility to the area engineers living with the contractor was a gross error in my mind." Proximity made it hard to maintain a clear perspective on the constructors' actions and expenditures.²⁴

The views of some of the area engineers seemed to add credence to Hartung's concern. Kelly became a strong partisan of Negev Airbase Constructors. He lauded their cost accounting and procurement systems and was generally satisfied with how they did business. Taylor also expressed his approval of Air Base Constructors and applauded their commitment to the schedule.²⁵ Perhaps they understood better than anyone else that "fast track construction, by its very nature, is a cooperative process." He felt that contractors who were forced to go to extraordinary lengths to defend and justify their costs might not get the job done.²⁶

Wall did not consider the rapport between the area engineers and the contractors a problem. He was more concerned with protecting Kelly and Taylor from frequent inquiries and close oversight by the program managers. "If the contracting officers were up here," he asserted, ". . . they would be constantly barraged with 'what if' questions." Wall considered that one of his major responsibilities was "to insulate the contracting officers away from all this cheap stuff so they can manage their jobs."²⁷ As far as keeping them honest was concerned, procurement regulations, auditors, and attorneys provided sufficient safeguards.²⁸

The disagreement about where to place contracting officer authority reflected larger questions concerning relations between the area offices and Tel Aviv. The issue involved the nature and level of headquarters involvement in construction as carried out in the field. When Wall arrived he thought the area offices appeared unduly defensive but saw the need to act as a buffer between them and the program managers so that the area engineers could solve their own problems. He also saw antagonisms between staff sections in Tel Aviv and in the field, notably in the procurement area but elsewhere too. Wall thought he succeeded in providing the space in which the area offices could operate. Blake at Ovda agreed; others did not. Taylor complained that he spent more than half his time dealing with questions from Tel Aviv. The net effect of these inquiries, according to Taylor, was to keep him and his staff from concentrating on their work. Kelly felt less put upon but objected to the Tel Aviv staff's direct approaches to the contractor. He insisted that Wall's people deal with Negev Airbase Constructors through his office.²⁹

The managers for the construction contractors had different views of the headquarters in Tel Aviv. Butler at Ramon said that while the job was easy, the network of relationships was difficult to sort out. Wall's office consumed a great deal of his time. So did Hartung's, Bar-Tov's, and the large number of Israeli Air Force consultants and designers. Davis agreed, noting that "everybody up there has something to say." At least, he said, the removal of North Atlantic Division from the Corps' chain of command cut the number of parties to which he had to report.³⁰ Much of this sentiment among the contractor managers at the sites may have been based on experience with fixed-price contracts. They were unaccustomed to such intensive Corps involvement in their work, resented it, and wanted to make their own decisions. However, some of the Corps construction personnel also saw too much involvement by headquarters.³¹ As Bill Parkes, chief of vertical construction for the area office at Ramon, said, "We have more layers of management on this job than I have ever seen anywhere in my life, anywhere at any time. It's ridiculous."³²

One of the major criticisms leveled against Wall's office from the field involved the time it took to convince Tel Aviv to authorize more workers. During the spring and summer of 1980 the area offices, particularly Ovda, hounded the Near East Project Office for permission to hire more people. The Ovda master diary was full of pleas for authority to bring in 500 additional Thais and to raise the number of "direct workers," those directly involved in construction, up to nearly 1,500. Blake and almost the entire staff agreed



Utility ducts (left); a backfilled and compacted utility trench.

that “this job is in jeopardy if we cannot decide by 1 September 1980 to go to an increased level of manpower.”³³ While trying to prove its case with Tel Aviv, the area office at Ovda also did what it could to correct things. Where possible, support workers—“indirects” in the jargon of the project—were reassigned to construction. Toward the end of June, Blake halved janitorial services in the management billets and the offices so he could put more men on the job.³⁴

Wall sent Lt. Col. Fletcher H. “Bud” Griffis to Ovda early in July. He wanted Griffis, who was new to the project, to see to the firing of 300 workers. Griffis assessed the situation and concluded that the area office needed 600 more workers. He convinced Wall to change his mind. At the end of the month Wall approved large increases for both sites: 300 Portuguese for Ramon and 500 Thais for Ovda, where Captain Roberts wrote, “The manpower struggle was finally concluded.” Within a month the contractor’s agents in Bangkok sent the first new workers into Israel, causing hasty expansion of the work camp.³⁵

Although he had made the basic decision on an increase in manpower, Wall wanted a team from the United States to review direct labor needs. McNeely chaired the group. Wall asked Lewis to send a senior member of his staff, preferably Vinitsky or Herbert Howard, but instead got Charles Schroer, assistant chief of con-



Thai kitchen workers at Ovda

struction in Baltimore District. The other three members were senior executives in the firms that made up Management Support Associates. The group visited the sites, evaluated progress, and studied use of the work forces. Based on interviews and brief visits, the team verified the need for more workers and even recommended increases beyond those approved by Wall. Members noted that excavations for utilities at Ramon consumed many more man-hours than had been expected. At Ovda the 400 men working within the shelter complexes could have been doubled easily if the manpower were available. In general, many activities on the sites were starved for labor. The compelling fact was that the current production rate of 2 percent each month would be insufficient to finish on schedule.³⁶

Inquiries into the size of the work force never related to the quality of the labor. The Portuguese and Thais both contributed to the cultural and linguistic diversity that sometimes caused problems at their work sites, but they were respected for their industry and skill. Blake, who was not easily pleased, called the Thais "exceptional little guys." He and most observers considered them

adept craftsmen and fast learners, although their lack of upper body strength was sometimes a problem. They also were well-mannered and disciplined workers, who caused few problems. Management also highly regarded the Portuguese, who were a somewhat troublesome presence in the towns near Ramon but excellent workers nonetheless.³⁷

While the labor force was good, there were still problems with the placement of work. Nowhere was this more evident than in the shelter complexes. After moving so well in the early summer of 1980, work on these facilities ran into a major difficulty in August. A consultant to the Ministry of Defense concluded that some of the walls of the ammunition storage facilities within the complexes would be unable to support the earthen cover. If this proved true, a fatal design error existed. Work on affected buildings at Ramon stopped immediately, and a search for a remedy began. In September work at Ovda stopped on almost all shelter features except arches and exhaust flumes.³⁸

From that summer to the following winter, other potentially serious design flaws were discovered. During that period construction of unaffected portions continued, rumors of numerous defects spread, and inquiries regarding solutions proceeded. Most of the questions involved the structural integrity of walls after they were covered with earth. Other problems concerned subsurface drainage of the shelter complexes during heavy rain, the ability of the buildings to withstand seismic disturbances, and fireproofing. The need to deal with these questions and problems delayed construction of these critical base features and added a feeling of uncertainty to the job. From June through September, 97 of the 202 engineering change proposals pertaining to the shelter complexes were issued. At the end of July Butler reported the need to revise over one hundred drawings to reflect the changes. He thought the expenditure of so much time and money would eventually affect production of other vital facilities. At Ovda Davis also feared that the changes would derail his construction schedule.³⁹

The protracted examination of design flaws and discussions of solutions probably frustrated and annoyed the Israelis as well. Although Hartung had advised against departing from their initial plan of replicating the Sinai bases, they chose an experimental design. The Americans, who were accustomed to far more detailed plans than the Israelis produced, complained that they had to augment the drawings before turning them over to construction crews. Now errors were turning up in the shelter plans, and some of the Americans claimed that these were the major cause of unexpected expenses and delays. The Israelis took strong exception.



Excavation of Glide Path Hill at Ramon

Bar-Tov said the whole business was blown out of proportion. He believed that the Americans were wrong in attributing increased costs to the changes. In fact, he thought the changes saved money by improving design. Moreover, the Israelis disagreed with the contractors' claims that late design drawings delayed construction. When the contractors did receive the plans, the Israelis said with some justification, they did not always start work quickly.⁴⁰

Hartung thought the Israelis were unnecessarily defensive about the mistakes. "I don't think," he said, "any designer would have designed something from scratch, brand new, and not make mistakes in that short time-frame. It doesn't matter who he is. He might have made different ones, but he would have made them."⁴¹

While the problems were debated for several months, work on the shelter walls and arches continued. These portions of the structures were the largest and most costly parts of construction, so it was fortunate that the work could go on. At Ramon the last arch was poured in January 1981, even before agreement on design alterations.⁴²

In early 1981 solutions that satisfied all participants finally emerged. In part the delay until winter was intentional. Hartung

convinced Bar-Tov to wait until January so deliberations regarding changes would not distract the contractors during peak design activity. Then "a joint structural engineer task group" could review the entire shelter system, evaluate all deficiencies, and determine the best solution. "Treating the shelter complex as a system," Hartung contended, "rather than a series of parts, should result in least cost and time construction effort retrofits."⁴³ The task group of about thirty-five engineers, representing the three prime contractors, all three managers, and the Israeli designers, met in late January. They looked at five solutions for dealing with the structural deficiencies of buildings in the shelter complexes. The remedies included building two types of retaining walls, one of reinforced concrete and another of gabions (rock-filled galvanized wire cages). Others included gravity walls of mass lean concrete and two approaches to reinforcing the earthen backfill. One of these required the use of *terre arme* panels, interlocking blocks of precast reinforced concrete anchored in the ground with steel straps. The fifth option, concrete modified backfill, was adopted as the quickest and least costly way to reinforce the walls. The committee added a drainage system that carried water away from the structures to prevent the buildup of hydrostatic pressure.⁴⁴

In spite of the problems with the shelter complexes during the summer and fall of 1980, progress on permanent facilities was beginning to be noticeable. Carl Damico of the construction division felt he was in a transitional period during August with buildings rising as design started to wind down. Gilkey thought both sites were "just about to explode" and expected that the recently authorized increases in manpower would bring the rapid increases in production that Morris and Wall agreed were so necessary. Hartung said that construction "really started to bloom" in September.⁴⁵

And it did. Much of the preliminary horizontal and underground work, some of which was difficult to see, was out of the way. Both sites had perimeter fences and patrol roads. At Ovda a fifteen-kilometer canal, big enough to carry off the waters of the biggest flood expected in a 100-year period, was in place. At Ramon Glide Path Hill, the small mountain at the end of the runway, was no more. The 300,000-cubic-meter hazard had been leveled to clear the flight path, with the rock hauled off and used as fill for roads and camp facilities.⁴⁶

Work on the runways gathered momentum toward the end of the year. Stripping and excavating for the 10,000-foot runways actually began at Ramon in late 1979 and at Ovda in January 1980. In September Ramon was placing subbase and planning to add a second shift of workers to accelerate progress. The Ovda landing strip

was further along, with the first application of base course material under way. The work there moved along so quickly that the commanding general of the Israeli Air Force, Maj. Gen. David Ivry, made a ceremonial landing of a jet fighter at the end of November.⁴⁷

Both sites had problems with horizontal construction. The difficulty with the runway at Ramon came about because the embankment was allowed to dry out and crack. The contractor nevertheless started to spread the subbase over the inadequate surface. The initial solution, removing a seven-centimeter layer and recompacting the material below, was rejected. Tel Aviv and the area office agreed to scarify, disk, moisten, and recompact the subbase rather than remove it. Wall did not "consider this significant, especially when compared to the original fix intended." The next layer, or base course, required rock that was considerably harder than that produced by the quarry. A separate crushing operation was set up at the nearest source of adequate wadi gravel, about five miles away. Because of these complications, Taylor required the contractor to double the quality control staff and increased his own emphasis on that area. At Ovda quality control on horizontal work also became a major concern as the year wore on. Kelly complained that the contractor had too few people watching construction on the roads as well as the runways to ensure proper grades and thicknesses of layers of base course.⁴⁸

Ultimately, the problems with horizontal work called into question the adequacy of the process by which the quality of construction was ascertained. Responsibility for quality control and inspection on Corps projects usually rested with the contractor, while quality assurance, consisting essentially of sampling, surveillance, and verification, was the government's job. In Israel, because of the need to minimize the number of permanent government employees, the Corps assigned quality assurance to Management Support Associates. This arrangement, in which construction management services were contracted, was not unknown in private construction but was unusual for the Corps of Engineers. During the mobilization phase of the project, the spectrum of activities involved in ascertaining the quality of construction appeared to cause more problems at Ramon than at Ovda. In any case, only the Ramon Area Office raised questions for the record. Nevertheless, by the beginning of 1980 General Morris became concerned about implementation at both sites and ordered Gilkey to hold O'Shei and Curl personally responsible for implementation of procedures. Morris' expression of concern brought immediate albeit partial results. Both sites hastened to establish laboratories where they could test materials and production. With command atten-

tion focused on the situation, Colonel Kett, who was still looking for meaningful work, finally found an opportunity to put to good use his experience with pavements.⁴⁹

Command interest was helpful, but progress remained slow. In February Curl assured Morris that his laboratory was functioning, but two months later he still complained that the contractor did not provide enough people or equipment. At Ramon not until September did the area engineer insist that the constructor establish a procedure for notifying and briefing quality assurance people and site activators before starting work on a new building. He wanted the discussion to cover general methods, specific requirements, and specifications.⁵⁰

A variety of problems beset efforts to make sure the job was done right. Defective precast shelter panels sometimes left the plant for delivery to the work site, only to be rejected there. In other instances, crews were turned loose to work on a building without access to adequate drawings. At Ramon O'Shei complained that Butler had too few qualified field construction people as well as inadequate procedures. Butler agreed that his operation was "poorly manned," but blamed "absurd local testing requirements imposed by local standards" for his troubles.⁵¹ It was plain by mid-1980 that quality control would be a major issue between the Corps and its contractors, on one hand, as well as between the Americans and the Israelis on the other.

Concrete production, which proved to be an almost intractable problem at Ramon, was the major issue there from a quality control standpoint. In April an inspector's slump test showed that concrete containing too much water was being placed in the footing for an aircraft shelter. In July the foundation for the control tower had to be ripped out because the material was structurally inadequate.⁵²

At first, O'Shei suggested solutions to the contractor. These included plant controls, such as improved procedures for batch tickets and closer surveillance of scales and water meters during batching, and more stringent field controls, particularly regarding addition of water to the mixture. Later, he took a tougher position and required submission of written procedures before placement of concrete on shelter roofs. O'Shei's requirements seemed to have little effect. Taylor faced the same problem and had to order the removal of the control tower's foundation, "a major setback" that retarded completion of the structure for three weeks. Then in August he complained about carelessness in curing procedures for the floor of the facility for storing liquid oxygen.⁵³

Finally, Taylor issued detailed instructions for quality control, warning that he would halt concrete operations if the situation did

not improve. He wanted more stringent inspections before placement and also verification by quality control personnel of the accuracy of the quantity, type of mix, and location for each delivery. He also insisted that weigh tickets indicate the amount of water permitted in the mix and that field personnel be kept from adding excessive water. He determined that workers at the plant and those overseeing quality needed more training. Finally and perhaps most important, Taylor wanted the person responsible for the design and testing of the mix identified by name. His efforts to document activities involved in production proved very effective. One quality control supervisor had been extemporaneously adjusting the mixture of cement and water "like a cook stirring a big pot somewhere, and testing it every now and then," rather than adhering to specifications. With problems identified and controls established, Taylor allowed production to continue, but only conditionally, on the basis of biweekly evaluations. Until well into the autumn, he carefully monitored production of concrete.⁵⁴

The cement from which the concrete was made turned out to be part of the problem, and stringent quality control became necessary here as well. Much of the cement supplied by the Israeli firm Neshet proved to be of a much coarser grind than the Americans normally used. Also, it sometimes came in quite hot, not having been allowed sufficient time to cool in a silo. Changes in the contract with the supplier corrected some of these deficiencies. Filtering the material for foreign particles as it was taken from the trucks also helped, although this practice made no friends among the truck drivers who delivered it and sat waiting for the process to be finished.⁵⁵

By the end of 1980 the area offices sorted out arrangements for verifying quality. The program involved more than 100 people at each site. Ovda had a total of 115 authorized, with 96 contractor employees working in the area of quality control and 19 from Management Support Associates dealing with quality assurance; Ramon had 82 and 23, respectively. Although the support contractor's people did the work, Corps managers understood that the program remained their responsibility.⁵⁶ With nearly one-fourth of construction finished at the end of the year, stabilization of the surveillance program could not have waited much longer.

As work progressed and activities associated with verifying the adequacy of the work became more important, the small teams representing the program managers became more involved at the sites. These teams, known collectively as the Air Force regional civil engineer, reflected a standard United States Air Force approach to construction management. Initially Hartung had wanted a group of

three or four at each site acting as the customer to the Corps and as liaison with the Israeli Air Force. As in all major construction for the U.S. Air Force, he noted, the teams would provide the focal point for coordination between the user's needs and those of design and construction management. This concept of the regional civil engineer as an American organization that handled coordination between the Corps and the Israelis at the sites was embodied in the memorandum of understanding between the Corps and the Air Force. The agreement specified that the Air Force would set up such a group, which would report to the program manager. Although the document listed fifteen separate functions, most of them were different ways of saying that the unit would review progress and coordinate American work with Israeli needs, particularly when it came time for final acceptance of facilities.⁵⁷

The organization that was established in April 1980 emerged in a very different form than originally anticipated. Hartung's office drafted a standard operating procedure that from the outset assumed that the team would include representatives of the Israeli program management office as well as his own. "We created something different here," Hartung said, "the only AFRCE in the whole U.S. Air Force that is international." Working from the premise that the Israelis were in fact participants in decision-making, Hartung said he "brought the staff of General Bar-Tov and my own staff . . . under the umbrella of the AFRCE." The organization consisted of an ad hoc headquarters, drawn from the two program management offices, that functioned as the regional civil engineer only when needed. At the sites the teams had formal structures with permanently assigned members from the program management offices and the Israeli Air Force. As Hartung saw it, the combined unit, headed by his deputy, Col. John R. Harty, became "in effect the user." Control of construction still rested "on the U.S. side," Hartung insisted, ". . . but you don't try to make a big issue of it." Gilkey's office accepted the proposal.⁵⁸

For Hartung this "kind of unique organization" represented a compromise. He tried "to stick to standard practice between the Corps of Engineers and the Air Force . . . so everybody doesn't have to learn new ways of doing things." He also knew that in this situation he could not entirely do so. The joint regional civil engineer constituted a creative response to an unusual situation: the Americans rarely built for a foreign client that was technically competent to build its own bases.⁵⁹ The arrangement also testified to the force of Bar-Tov's personality. Like the procedure that had been set up for the configuration control board, the joint team

showed the degree to which Bar-Tov had solidified his position as Hartung's partner in management.

Although the organization differed significantly from the typical structure, the mission remained the same as originally intended. The site teams did become involved in unconventional areas, such as assistance with local procurement. Each team included an economist from the Ministry of Defense for this purpose, although the purchasing help did not always come as quickly as the area engineers might have liked. This liaison group inevitably became the focus of some of the tension that developed in the haste to get the job done. At Ramon junior officers did a little editing and "AFRCE" became "FARCE." At Ovda both the American and Israeli members of the team questioned the accuracy of the area office's situation reports. Blake, preoccupied with problems in shelter design, lack of transportation for equipment, and the shortage of quality control and quality assurance people, responded with customary bluntness. "I advised them," he wrote, "that if they start picking at it, they may not continue to get it." In spite of such troubles, overall relations seemed "cooperative and supportive" at the end of the year, according to James Wharry of the chief's office, who singled out the Israeli component for particular credit as "a perceptive advocate for the Israeli MOD."⁶⁰

While Israeli positions were well articulated within the framework of the liaison organization, Hartung's claim that the Americans retained control of construction was still valid. When the time came to turn over facilities, the area engineers dealt only with the U.S. Air Force. That, according to Kelly, was "the way it should be." He said that despite the appearance of participatory management, Hartung was "a very strong personality and he exercises very central management."⁶¹

Notes

1. Hartung interview, Apr 81.
2. Grafa interview.
3. Lewis interview, Jan–Feb 82, part 2.
4. Interv (telephone), author with Col Robert K. Tener (Ret.), Jan 85.
5. McNeely interview, Mar 84; Lewis interview, Jan–Feb 82, part 2.
6. Wall interview, Aug 80.
7. Ibid., May 81.
8. Morris interview.
9. McNeely interview, Mar 84; Lewis interview, Jan–Feb 82, part 2.
10. Tener interview.
11. Ibid.
12. Ltr, Wall to Tener, 26 May 80, Tener Papers, IABPC, 89/5.
13. Tener interview; Ltr, Tener to Wall, 10 Jun 80, IABPC, 89/5.
14. Tener interview.
15. Ibid.
16. Peterson interview, May 81; Hartung interview, Apr 81; NEPO Sitrep No. 47, 23 Sep 80, IABPC, 14/12.
17. Telex, Blake to NEPO, "Attention: COL Gilkey," 12 May 80, sub: NEPO Procurement Guidance No. 2, IABPC, 33/1; Wall interview, Aug 80; Wall, Project Notebooks, vol. V, 12 Jun 81, IABPC, 90; Blake interview.
18. Peterson interview, Oct 81; Curl interview; MFR, Noah, 14 Feb 80, sub: Poor Behavior of LTC B. F. Miller, IABPC, 1/2; Bar-Tov interview, Apr 81.
19. Taylor interview.
20. Interv, author with Irving Davis, Aug 80, Ovda, Israel; Wall interview, Aug 80; Hartung interview, Apr 81.
21. DF, Moon, Engineering Division, to Project Engineers, 4 Apr 80, sub: Monthly Progress Report, IABPC, 33/1.
22. Wall interview, Oct 81; Hartung interview, Apr 81 and May 82.
23. Brown interview, Apr 81 and Apr 82; Hartung interview, Apr 81 and Oct 81; Wall interview, May 81; Interv, author with Leroy H. Graw, Apr 81, Tel Aviv, Israel.
24. Hartung interview, Oct 81 and May 82.
25. Interv, author with Col Patrick J. Kelly, May 81, Ovda, Israel; Taylor interview, Jun 81.
26. William R. Squires III and Michael J. Murphy, "The Impact of Fast Track Construction and Construction Management on Subcontractors," *Law and Contemporary Problems* 46 (January 1983): 64.
27. Wall interview, May 81.
28. Peterson interview, May 81; Maloney interview, May 81.
29. Wall interview, Aug 80 and May 81; Blake interview; Taylor interview; Kelly interview, Oct 81.
30. Butler interview; Davis interview.
31. Parkes interview, May 81; Grafa interview.
32. Parkes interview, May 81.
33. Blake interview; OAO, Master Diary, 1 Jul 80, IABPC, 84/2.
34. OAO, Biweekly Sitrep, 16–30 Jun 80, IABP files, WNRC, Accession 77–83–1016, Box 10.
35. Interv, author with Col Fletcher H. Griffis, Aug 86, New York, N.Y.; NEPO Sitrep No. 44, 5 Aug 80, IABPC, 14/9; Ltr, Special CE/MSA Team to Wall, 13 Aug 80, sub: Summary Report of Analysis of DCCs Direct Manpower Utilization and

Requirements, IABPC, 4/4; OAO, Master Diary, 28 Jul and 22, 25, and 29 Sep 80, IABPC, 84/2; Blake interview.

36. Telex, Wall to Lewis, 3 Aug 80, sub: Review and Analysis of Manpower Requirements at Ramon and Ovda, IABPC, 4/4; Ltr, Special CE/MSA Team to Wall, 13 Aug 80. MSA members were Joseph E. Robbins, president of Pope, Evans and Robbins; George E. Heunsch, vice president of A. Epstein and Sons International; and John P. Sylva, vice president of Lester B. Knight and Associates.

37. Blake interview; Davis interview; Wall interview, May 82; Gilkey interview; Grafa interview; Butler interview; Parkes interview, May 81.

38. DF, Damico to NAIPM-AD, 29 Aug 80, sub: Input for Chief's Report; and Ltr, Taylor to Butler, 27 Aug 80, sub: Shelter Complex 13.2, Facilities 8, 10, 11, 13, and 16. Both in IABPC, 33/2. OAO, Master Diary, 23 Sep 80, IABPC, 84/2.

39. MFR, David Levi, NEPO Engineering Division, n.d. [meetings, 19–20, 22 Jan 81], sub: Aircraft Shelters' Fatal Errors, IABPC, 86/10; MFR, Levi, n.d. [meeting, 27 Jan 81], sub: Aircraft Shelters' Fatal Errors' Fixes and Subsurface Drainage In-house Design Review, IABPC, 86/10; MFR, Blake, 6 Nov 80, sub: Fatal Errors in Shelter Complexes, in OAO, Master Diary, IABPC, 84/2; Griffis, Daily Journal, P&C Office, 27 Oct 80, IABPC, 41/1; NEPO Engineering Division, ECP Log, IABP files, WNRC, Accession 77–83–1025, Box 46; ABC Design/Engineering Narrative Report—Problem Areas, 31 Jul 80, IABP files, WNRC, Accession 77–83–1025, Box 4.

40. Hartung interview, Apr 81; Hays interview; *ENR* 205 (30 October 1980): 27; Thomas interview, Oct 81; Bar-Tov interview, Oct 81.

41. Hartung interview, Apr 81.

42. (Tel Aviv) *Ha'aretz*, 14 Jan 81.

43. Ltr, Hartung to Bar-Tov, 25 Nov 80, sub: Aircraft Shelter Complex—Fatal Errors, IABPC, 86/10; MFR, Harty and Bar-Tov, 29 Dec 80, sub: DOD/MOD Program Managers Meeting of 24 Dec. 1980, IABPC, 45/4.

44. MFR, Levi, NEPO Engineering Division, n.d., sub: Aircraft Shelters' Fatal Errors, IABPC, 86/10; MFR, Levi, n.d., sub: Aircraft Shelters' Fatal Errors' Fixes and Subsurface Drainage In-house Design Review, IABPC, 86/10; Amendment to Specifications, vol. III, 17 Feb 81, IABPC, 86/10.

45. Damico interview, Aug 80; Gilkey interview; Wall interview, Aug 80; Hartung interview, Apr 81.

46. *ENR* 205 (30 October 1981): 29.

47. Memo, Clifton for Area Engineer, Ramon, 2 Nov 79, sub: Weekly Progress Report, Ramon, IABPC, 22/4; Deputy Area Engineer, Ovda, Weekly Sitrep, 13–18 Jan 80, IABPC, 13/11; Butler, ABC Weekly Sitrep, 10 Sep 80, IABP files, WNRC, Accession 77–83–1025, Box 4; OAO, Biweekly Sitrep, 16–30 Sep 80, IABP files, WNRC, Accession 77–83–1016, Box 10; (Tel Aviv) *Ha'aretz*, 30 Nov 80.

48. Hartung interview, Apr 81; Telex, Hartung to HQ USAF, 2 Sep 80, sub: Israeli Air Base Program, DOD/PMO Sitrep Aug. 1980, IABPC, 3/6; Ltr, Taylor to Wall, 31 Aug 80, IABPC, 38/1; Telex, Wall to Lewis, 10 Sep 80, sub: Your Msg, 9 Sept. 1980, IABPC, 2/5; Parkes interview, May 81; OAO, Master Diary, 4 Nov and 11 Dec 80, IABPC, 84/2.

49. Ltr, Dorman R. Mabrey, Assistant for Contract Administration, MSA, to NEPO Contracting Officer (Damico), 10 Jan 80, sub: MSA Task Directives 1–000 through 14–000, IABPC, 31/3; Richard D. Connor, "Contracting for Construction Management Services," *Law and Contemporary Problems* 46 (January 1983): 20–21; Ltr, Clifton to GM, ABC, 28 Oct 79, sub: Contractor Quality Control, IABPC, 22/3; Ltr, Clifton to NEPO Project Manager, 7 Dec 79, sub: Weekly Progress Report, Ramon, IABPC, 31/1; Ltr, Gilkey to O'Shei and Curl, 31 Jan 80, IABPC,

31/3; NEPO Sitrep No. 29, 11 Feb 80, IABPC, 13/14; DF, Kett to Gilkey, 27 Feb 80, sub: Visit to the Ovda Site 21 and 22 Feb. 1980, IABPC, 32/2.

50. Ltr, Curl to Pettingell, 14 Apr 80, sub: Quality Control Laboratory at Quarry, IABPC, 33/1; Ltr, Taylor to Butler, 2 Sep 80, sub: Preparatory Inspections, IABPC, 33/3.

51. Telex, NEPO to Area Engineer, Ramon, 18 Apr 80, sub: QC and QA on Precast Shelter Panels, IABPC, 33/1; Ltr, O'Shei to Butler, 16 May 80, sub: Work Item 52—Automated Warehouse, IABPC, 33/1; Ltr, O'Shei to Butler, 17 May 80, sub: Vertical and Horizontal Quality Control, IABPC, 33/1; ABC Weekly Sitrep, 25 May 80, IABPC, 14/5.

52. Ltr, O'Shei to Butler, 16 Apr 80, sub: Concrete Testing at Placement, IABPC, 33/1; Ltr, Taylor to Butler, 8 Jul 80, sub: Work Item 010, Control Tower, Foundations, IABPC, 33/2; Parkes interview, May 81.

53. Ltr, O'Shei to Butler, 29 May 80, sub: Quality Control of Concrete Operations, IABPC, 33/1; Ltr, O'Shei to Butler, 27 May 80, sub: Quality Control Procedures for Domes in Shelters, IABPC, 33/1; Ltr, Taylor to Project Manager, 15 Jul 80, sub: Ramon Air Base Progress Report 1–15 July 1980, IABP files, WNRC, Accession 77–83–1025, Box 4; Ltr, Taylor to Butler, 26 Aug 80, sub: Concrete Curing and Protection, IABPC, 33/2.

54. Ltrs, Taylor to Butler, 23 and 29 Aug, 15 Sep, and 15 Oct 80, sub: Control of Concrete Quality, IABPC, 33/2–4; Parkes interview, May 81.

55. Parkes interview, May 81.

56. DF, Acting Chief, Construction Division, to Project Manager, NEPO, 23 Oct 80, sub: Project Management and QC/QA for Construction Sites, IABPC, 23/4.

57. Ltr, Hartung to Gilbert, 30 Nov 78, sub: Methods of Accomplishing/Managing Israeli Air Base Construction, IABPC, 89/3. For a summary of the U.S. Air Force's system of construction management, see Maj. Gen. Clifton D. Wright, Jr., "Air Force Engineering and Services—Investing Today for a Better Tomorrow," *Constructor* 67 (May 1985): 47–52.

58. Wray and Gilbert, Memorandum of Understanding Between the DOD Agencies in the Israeli Air Base Construction Program, 25 Jul 79, IABPC, 11/2; MFR, Bar-Tov and Hartung, 3 Mar 80, sub: DOD/MOD PMs Meeting 28 Feb. 1980, IABPC, 45/4; Hartung interview, Aug 80; SOP 18, Air Force Regional Civil Engineer (AFRCE) Organization, 11 Apr 80, IABPC, 15/18; MFR, Bar-Tov and Hartung, 2 Apr 80, sub: DOD/MOD PMs Meeting 27 Mar. 1980, IABPC, 45/4.

59. Hartung interview, Aug 80.

60. DF, Graw to Gilkey, 3 Jul 80, sub: Input for Letter to the Chief of Engineers, IABPC, 33/2; Ltr, Taylor to Lt Col Reeves Smith, DOD PMO, AFRCE-Ramon, 5 Nov 80, sub: Lack of Response to Request for Information, IABPC, 33/4; OAO, Master Diary, 30 Jul and 5 Nov 80, IABPC, 84/2; Lloyd interview; MFR, Wharry, 17 Dec 80, sub: Trip Report—Israel Air Bases Construction Project, IABPC, 8/2.

61. Grafa interview; Kelly interview, May and Oct 81.