U.S. Army Corps of Engineers and Afghanistan's Highways 1960–1967

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Abstract: The Corps of Engineers managed construction of nearly one-third of Afghanistan's modern road network. The Corps carried out the project, which took place in several segments over the period 1960–1967, through field offices in southern Asia. The effort was unusual for the Corps in that part of the world because it was strictly a civil project and had nothing to do with creation of military infrastructure. It also constituted the first face-to-face confrontation between American and Soviet foreign aid programs during the Cold War and was seen by American political leaders as a test of the national willingness to compete with the Soviets in a nonmilitary arena. The interconnection between diplomacy and construction continued for the duration of the program, and the border dispute between Afghanistan and Pakistan caused the greatest problems. In spite of this dispute and technical difficulties related to the stark Afghan topography and climate and the availability of construction materials, the program was a success.

Introduction

When Soviet armed forced invaded Afghanistan in December 1979, the small mountainous nation in southern Asia became the focus of worldwide attention. Part of the interest centered on the country's 2,700-mi network of paved roads, a substantial portion of which was built under the management of Mediterranean Division of the Corps of Engineers for the Department of State. The American assistance program in Afghanistan, over a year old when Engineer participation began in 1960, covered several areas. In addition to roads, the government of the United States financed an irrigation project for the Helmand valley, Kandahar's international airport, and administrative training for Afghan public officials. The International Cooperation Administration ran the program until abolished under the provisions of the Foreign Assistance Act of September 1961. In November of that year, the State Department set up the Agency for International Development. Known familiarly as AID, this agency took over some functions of the Development Loan Fund and the Export-Import Bank. It superceded the International Cooperation Administration as the manager of economic and technical assistance programs, as presented in Public Law 87-195 and *The AID Story*.

In Afghanistan, the purposes of the highway projects begun under the International Cooperation Agency reflected many of the long-range goals of the entire assistance effort. Known as the Afghanistan Regional Transportation Project, the road program sought to improve the Afghan economy through expansion of trade. Moreover, better transportation would increase contact between government officials and the public, leading to improved political cohesiveness, an important objective in a land of many tribal loyalties. Finally, all of the projects would promote continuing friendship between Afghanistan and the United States (*Project* 1968).

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Competition with Soviet Union

The reason for the American assistance program went beyond these stated needs, with their emphasis on the problems of a small landlocked Asian nation, to the Cold War competition with the Soviet Union. In Afghanistan this competition began in the mid-1950s with the well-timed Russian offer of economic aid. Tensions between Afghanistan and its eastern neighbor Pakistan were high, and the latter received substantial American help. The Soviet offer, which found a hearty welcome in the capital city of Kabul, reflected a traditional Russian quest for influence in lands to the south, a pursuit whose ultimate goal was access to warm-water ports. But it also marked a dramatic shift in Soviet foreign policy, away from the Stalinist view of the world as divided into two camps—who is not with us is against us—and toward an effort to gain influence in less developed nations through economic means. The 1954 commitment to construct grain silos, a bakery, and a flour mill for Afghanistan was among the first indications of this change in Soviet policy (Walters 1970; Smith et al. 1973).

In the next few years the Soviet presence expanded greatly. In 1956, Afghanistan accepted a Russian offer to construct a highway from Kabul north across the Hindu Kush Mountains to the Soviet border. Three years later the Soviets began another major road, this one connecting Kandahar, the second largest city after Kabul, with the Soviet border by way of Herat. During this period of rapid expansion, Russian aid amounted to one-third of the total capital invested in Afghanistan. In the early 1960s the Russian portion grew to about one-half (Smith et al. 1973; Tansky 1966).

The Soviet government went to great lengths to accomplish the road-building program. The asphalt highway north from Kabul included the extraordinary tunnel through the mountains at Salang Pass. At an altitude of over 3,700 m—high enough that drivers had to adjust their carburetors to take into account the lack of oxygen—Soviet engineers punched a 2.4-km hole through the mountains. The highest tunnel in the world, Salang was a major accomplishment by any standard. At a staggering cost of $42,000,000 ($400,000 per kilometer), the Soviets shortened the road to the border by 200 mi. Premier Alexei Kosygin presided over the opening in September 1964, and the Afghan Ministry of Planning joyfully reported "the fulfillment of the old dream of Afghanistan to pierce through the Hindu Kush mountains north of Kabul and link the northern and southern provinces by the most direct route" (*ENR* 1966; Dupree 1967; Goldman 1967; *Survey* 1964; Voelker 1988).

In addition to their major technical achievement at Salang tunnel, Soviet engineers found a way to avoid pouring concrete for culverts. Colonel Harry F. Cameron, the Gulf District Engineer from August 1960 to June 1962, remembered that the Russians designed and fabricated precast culvert segments. Using these, they assembled culverts anywhere from 1 to 15 m square. "Very clever, very well done, and well controlled," he called this work (Cameron 1988).

Overall, American observers rated Soviet methods as unsophisticated and inferior. In building nearly two-thirds of the road net, the Soviets used conscript Afghan labor instead of contracting the work to construction firms. There were also differences in quality. Soviet roads were generally considered inferior and experienced frequent washouts. The asphalt pavement laid

by the Russians for city streets in Kabul needed frequent repair. If anything, their concrete work was even worse. Wilhelm Voelker, a civilian materials engineer who worked for the corps, spent some time on the Soviet-built road between Kandahar and Herat, on which, he said, "they did a bad job, a very bad job." Their equipment had recently been built but was 10–20 years behind western machinery in design and was corroding all over. Using primitive, labor-intensive methods, they placed their concrete over shoddily prepared roadbeds. Potholing soon followed, and, as Voelker said, "potholing in concrete is disaster" (*ENR* 1966; King 1966; Franck 1960; Voelker 1988).

Colonel Cameron and Major Raymond Eineigl, who ran the Kandahar office late in the American project, also spoke of the Soviet indifference to proper roadbed preparation. Cameron said, "they did a very poor job on . . . subgrade, and they poured the road section in slabs." Consequently, "with poor subgrade, poor compaction, and all that, within a very few months the slabs were all tipping" (Cameron 1988). To Eineigl, their work was even worse than that. He said they merely "paved all over the camel s---" (Eineigl 1980).

The basic difference between the Soviet and American construction programs went beyond quality to orientation. The American roads of the same period ran more or less east-west and linked Afghanistan to Iran and Pakistan, mainly as parts of the trans-Asian highway. Soviet roads went generally north to south and connected to railheads on their own border. The highways built by both nations were critically important for Afghanistan, landlocked as it was between the Soviet Union to the north, Iran to the west and Pakistan to the south and east. Moreover, the nation had no railroads, so it depended on its roads for internal commerce and much of its contact with other countries.

The growing Soviet aid program, with its hydroelectric power projects, grain silos, and Kabul airport, as well as highways, brought the United States into Afghanistan. Ambassador Henry A. Byroade of the United States, a 1937 graduate of the U.S. Military Academy and a former engineer officer, considered Afghanistan an "economic Korea," a veritable battleground of the cold war on which the Soviet Union tested the willingness of the United States to commit its resources (Byroade 1961). Another State Department Official, Pakistan desk officer John Gatch, phrased it differently but said the same thing: "The Soviet Union has evidently decided to make Afghanistan one of the chief areas in which to wage the battle of 'peaceful co-existence'" (Gatch 1961). Journalist Harrison Salisbury, writing in the *New York Times*, agreed and called southern Asia "a critical sector of the free world's ceaseless struggle against Communism's challenge" (Salisbury 1962). It was in this context that the United States initiated its own large aid program and began to build roads in Afghanistan (Dupree 1973).

The decision of the United States to compete with the Soviet Union in Afghanistan led to the first face-to-face confrontation of the two aid programs. Highways built by the superpowers connected in several places. Engineers from both nations, always in civilian attire, met, consulted on mutual problems, and exchanged information, and studied each other's methods and work (Walters 1970).

Each of the roads ultimately built by the Americans in Afghanistan as parts of the Afghan Regional Transit Project had slightly different specific purposes. But they fit into an effort to foster the national economy through

improvement of the access to markets for Afghan farmers and to bring the people and government closer together. When the United States began its road-building program, Afghanistan had only about 110 km of paved roads. The rest of its essential arteries were little more than dirt trails that followed the caravan and invasion routes of antiquity. Even urban streets were unpaved, and in town as well as elsewhere most transportation was by pack animals. Snow in the mountains and flash floods in the desert made travel on these routes sometimes uncertain. An English visitor's account of the trek from Khyber Pass to the Afghan capital of Kabul illustrates the character of these trails. Ian M. Stephens spent 18 hours on the road and remembered it as "a continuum of jerks, bumps, potholes, rasping gear changes, abrupt braking, swirls of inblown dust from behind, [and] fumes from a much-afflicted engine. . . . This approach to a capital city must rank among the world's most irksome undertakings" (Stephens 1966).

Beginning of Corps of Engineers Involvement

The Corps of Engineers expressed interest in doing some of the highway work in Afghanistan as early as the winter of 1958–1959. As the decade ended, corps work in other parts of southern Asia was declining. In fact, just as negotiations over the Afghanistan project proceeded, plans were afoot in the office of the chief of engineers to close the Trans-East District in Karachi, Pakistan, and reassign its work and some of its people to the Gulf District in Teheran, Iran. Jobs in Afghanistan could be carried out with employees already overseas, in the Mediterranean Division office in Italy and in the districts at Teheran and Karachi. The International Cooperation Administration, on the other hand, lacked the technically skilled staff with which to supervise highway design and construction. Moreover, Ambassador Byroade urged use of corps management to speed the projects to completion. So in March 1960 the Corps of Engineers sent a team to look at the project in Afghanistan and agreed later in the spring to manage new road construction and to supervise the design work that was already under way. Late in May, Brigadier General Clarence Renshaw, the assistant chief of engineers for military construction, started looking for someone who would be ready to go to Afghanistan as area engineer as soon as the chief of engineers was ready to activate the office (Saccio 1959; Condron 1959; Hillman 1960; Fitzgerald 1960a, 1960b; "Afghanistan" 1960; "Personnel" 1960).

After the corps and the International Cooperation Administration signed a preliminary agreement in July 1960, another team of three engineer experts went to Afghanistan to evaluate the quality and amount of progress on the roads. The group included Thurston B. Wheeler, already selected as the future chief of the area office for Afghanistan when he left the Gulf District to join the team in early August, and two men from the Mediterranean Engineering Division, estimator and negotiator Paul M. Gill and civil engineer William O. Tatum III. They spent 17 days in Afghanistan, talking to diplomats and construction managers, looking at plans for the highways, and touring job sites, Soviet as well as American (*Project* 1967).

Corps Evaluation of State Department Program

The three took a close, hard look at the road program. They met with people involved in the assistance program, from Ambassador Byroade to

United States Operations Mission personnel and contractors and representatives of the Royal Government of Afghanistan. They drove the length of the roads that were being planned, checked project documentation, and viewed some of the Soviet road work from Kabul to the north toward Charikar.

The team found a number of problems, not all of which were due to the harsh construction environment. In fact, only the lack of sufficient water all along the lines of the road projects was directly attributable to the severe Afghan setting. High among other difficulties was the manner in which the design of the Kabul-to-Kandahar road, a key 515-km link in the main east-west trans-Asia highway from India to Turkey, was being done. The Ken R. White Company, an American firm under contract to the International Cooperation Administration, was responsible for the design of this highway and supervision and inspection of construction on it and a 96-km road from Kandahar that connected the main highway to the Pakistani border at Spin Baldak. White, which had only two Americans in the country working on the job, had determined the alignment and grade of the Kabul-Kandahar highway photogrametrically but had not done an on-the-ground survey and staked out the course of the road. Although the firm had been in Afghanistan for 18 months, it was far from ready to begin.

Perhaps the worst features of the White contract were those that it did not contain. The corps team noted the lack of a schedule for the completion of design; no requirement for complete analysis, tests, and profiles of the soils along the route; no provision for investigations and tests for bridge foundations; and a lack of a cost analysis of different kinds of drain structures. The team urged revision of the contract to include these provisions and others for preparation of cross sections and for staking out the centerline of the road. The report also recommended deletion of a provision for approval of structural drawings for bridges by the Afghan government and the United States Operations Mission. "Reserve all approval of engineering and technical matters," the document urged, "to the Corps of Engineers."

While White had the design job, another American company, A. L. Dougherty Overseas, Inc., had the construction contract for the road from Kandahar to Spin Baldak. Dougherty too was not prepared to start. The company estimated that it needed at least five months to acquire spare parts and rehabilitate the used construction equipment that the International Cooperation Administration had bought for the job. Dougherty's lack of progress meant more than mere delays in completion. In addition to the road contract, the company had a cost-plus-fixed-fee contract for restoring the equipment, so the U.S. government was obligated to reimburse Dougherty for the expenses that piled up while Dougherty waited for parts.

AID officials had already spent about $3,000,000 on this machinery. It was of diverse manufacture, and much of it dated back to World War II. Dougherty had the contract for rehabilitation of this equipment but lacked warehouses, open storage, and shops, all of which the International Cooperation Administration had promised to provide. Without these facilities, the contractor could not even determine the serviceability of the machinery and order parts. The corps team recommended that the construction contractor not be forced to use this equipment. The constructor should instead be allowed to buy its own equipment for the job and afterward either remove it or dispose of it to the Afghan or United States government.

As far as the actual construction of the Kabul-Kandahar highway was con-

cerned, the team recommended a new approach. The International Cooperation Administration and the mission in Afghanistan intended to do the work under a series of contracts, which were to be let as the funds became available. The team, on the other hand, "strongly recommended that, if it is at all possible to fund the entire project at one time, one unit price, lump sum contract for the entire road be let." Such an approach would save about $10 million, through elimination of duplicate contractor overhead and equipment costs and more efficient scheduling. Moreover, an incumbent contractor in an incremental arrangement was unlikely to reduce his bid to take into account the previous completion of mobilization. Instead, he was likely to increase his bid to where it was just below the offers he expected competitors to make.

Basically, the team concluded that the International Cooperation Administration was in over its head. It had written bad contracts based on faulty assumptions and incomplete specifications and had burdened itself and its contractors with equipment of dubious value. Moreover, the agency was also about to embark on an inefficient and expensive phased-construction plan. The report made no recommendation on whether the Corps of Engineers should take on the work, but it was plain that significant revisions of the contracts and management arrangements would be needed before the Corps could do so (*Project* 1967).

Corps Takes Over

At the beginning of November 1960 the corps and the International Cooperation Administration signed a participating agency service agreement for corps management of the road program. Overall, General Renshaw for the corps and D. A. FitzGerald, deputy director of operations for the International Cooperation Agency, agreed that the development agency would provide design criteria and money, the Engineers would contribute project design, contract adminisitration, construction supervision, and inspection. It was a good agreement from the point of view of the corps, giving the engineers complete operational, technical, and administrative responsibility for engineering and construction on the Kabul-Kandahar highway. In addition, the arrangement reflected the special concern raised by the advance party in August concerning construction equipment. It absolved the corps of responsibility for the equipment bought by the International Cooperation Administration and made clear that the corps would have nothing to do with the Dougherty contract for rehabilitation of the equipment (*Project* 1967).

The signing of the agreement must have been a foregone conclusion for at least a few weeks. The office in Kabul, known as the Afghanistan Area Office, was established on 10 October 1960. Area engineer Wheeler, who ran the office for its first two years of existence, reported to the Gulf District in Teheran. Before going to Kabul, Wheeler had been assistant area engineer in Burma. The office there, which had reported to the Trans-East District in Pakistan, also had had a major highway job for the International Cooperation Administration. The road project in Burma involved a feasibility study, preliminary design, and economic analysis for the 640-km highway from Rangoon north to the old imperial capital city of Mandalay. All of Wheeler's successors in Kabul except R. E. Phelps, who was essentially a caretaker for the office as the project wound down in 1967–1968, were majors and

lieutenant colonels. Wheeler, who was charged with overseeing all Corps of Engineers construction operations in Afghanistan, was described by Wilhelm Voelker as "in his fifties, tall, [a] level-headed man, and pleasant to work with, a good area engineer" (Voelker 1988).

Kandahar-Spin Baldak Road

At the outset, he had only one actual construction project, the Kandahar-Spin Baldak road. This job involved reconditioning the 105-km gravel road from Kandahar southeast to the Pakistani border at Spin Baldak. This road had originally been built for the International Cooperation Administration in connection with the Helmand Valley reclamation project to encourage the export of fruit grown in the valley. In 1948–1949 the American firm of Morrison-Knudsen built the original road, which consisted of a 150-mm base of processed gravel over a 150-mm subbase. It included bridges over the Mel Manda and Arghistan rivers, with Portland cement dip sections at other stream crossings. The roadbed followed a gradual rise from Kandahar to the border, crossing minor ridges on gentle slopes (*History* 1965; Wilber 1962).

This contract with Dougherty had been negotiated before the corps became involved in the Afghan Regional Transit Project, but the International Cooperation Administration turned it over to the Engineers. The Gulf District notified the contractor to proceed on the last day of 1960 and expected completion in 18 months. In addition to the main road, the contract included the widening of two extensions totaling almost 8 km in length in the city of Kandahar. A third bridge over the Tarnak River near Kandahar also provided an all-weather connection between Kandahar and the airport and ended the bottleneck to truck traffic that the stream created annually for much of the six weeks during which it was not dry. The multiple-span bridge's piers, beams, and deck were all made of concrete, but the spaces between the span-long lengths of deck of this and the other bridges on the road were filled with asphalt. On later roads, solid concrete decks were emplaced (*History* 1965; Voelker 1988).

Problems came nearly a year after work began. In November 1961, 12 mm of rain in the Kandahar area revealed flaws in the design of the pavement. The rise of gypsum salts through the reconditioned and primed roadbed along about 19 km of the roadway and failure of the asphalt mix in one place where construction had already been completed resulted in the issue of a stop order to the contractor (*History* 1965).

Construction along the entire length of the road halted so that the situation could be studied. An AID inspection team, sent to assess the damage, reported that exhaustive testing might have prevented the failure but would have been too costly and time-consuming in this case. The inspectors concluded that the White design had been in accordance with standard engineering practices and that Dougherty had build according to specifications. In March 1962, the contractor started work again, first on 82 km of the road that required no change in design. For the rest of the distance, Dougherty continued the job on the basis of a contract modification calling for drainage improvements and the addition of a crushed aggregate base. The corps transferred the completed road to AID in October 1962, four months behind schedule. Originally priced at $3,224,273, the modified contract as completed cost $3,888,434 (*History* 1965; *Project* 1967; Yarger 1962).

KABUL-KANDAHAR HIGHWAY

Unlike the road to Spin Baldak, the Kabul-Kandahar Highway was still in the design stage when the corps took over management of the roads under the transit project. The White firm carried out the work under its earlier contract, and corps management of the project really began with selection of the construction contractor. A consortium of American construction firms known as Afghan Highway Constructors won the contract. The joint venture consisted of Oman Construction, R. P. Farnsworth and Company, Wright Contracting, J. A. Jones Company, Morrison-Knudsen Overseas, and Peter Kiewit Sons. This highway was the largest and most important element of the American road program in the country, but not the largest part of their construction work for the corps in South Asia. Three of the constituent firms working together—Oman, Farnsworth, and Wright—already had Corps of Engineers contracts in Pakistan and Saudi Arabia totaling over $120,000,000, including the Dhaharan civil air terminal in the latter country. Much of the equipment for the road came from a job they had just completed in Pakistan (*Project* 1967; *Historical* 1960; Voelker 1988).

Although the advance team that had visited Afghanistan in August 1960 had urged construction of this highway under a single fixed-price contract, the lack of money made it impossible to follow the team's advice. The entire project was expected to cost somewhere around $40,000,000, but the funds on hand did not add up to even half that amount. With only $17,700,000 allocated when proposals were opened, some phased construction was inevitable. For bidding purposes, the job was divided into six usable increments, with two to be constructed immediately, and the other four later based on unit prices for the entire project. The consortium led by Oman made a low bid of $47,900,000, $20,400,000 of which was for the first two segments. Postaward negotiations reduced the latter amount to $17,700,000 (Swanson 1959; Messall 1963; *Project* 1967).

The two sections slated for construction at the outset were the end portions. Work on these started in June 1961. The 66-km stretch from Kabul southwestward was designated segment 1; a 114-km portion going northeast from Kandahar became segment 2. The initial emphasis was on the Kabul end, where the weather was more likely to become a problem. Work there would continue until conditions forced operations to move to the other end. Three construction camps initially served the project, the prime camps at each end, and a third along segment II at Kalat. Two others were planned for farther north on the central sections of the road, at Mukur and Ghazni. The deputy district engineer at the Gulf District monitored progress as he made his monthly rounds of the district's projects in Iran, Pakistan, Saudi Arabia, and Afghanistan (*History* 1965; Glasgow 1981).

For most of its length the bed of the new road followed the valleys of the Tarnak and Shiniz rivers, skirting the main range of mountains to the west. Sometimes the new road ran parallel to the old, a poorly maintained two-lane gravel road with, at best, narrow shoulders. Elsewhere it used the old bed. Between Kabul and Ghazni, where the elevation rose about 700 m in less than 80 km, the steep grades and sharp curves made improvement of the old road far too costly. It was plain that 48 km would have to be relocated.

Corps people thought the climate along the route resembled that of the

region between Phoenix and Denver, and the temperature in Kabul was known to vary between −18 and 38° C. The altitude at Kabul was about 1,900 m. From there the road climbed sharply to Ghazni and then gently descended for the next 400 km to Kandahar, at an elevation of 1,070 m. Segment 1, with its drastic changes in elevation, was the most difficult, but the central sections also presented problems. These included the lack of good sources of aggregate, stretches of highly plastic clay, and the need for more bridges over intermittent streams than were necessary on the other segments (*Project* 1967; Voelker 1988).

In the dry summer season, it was possible to drive from one end to the other in 11 hours. In the winter the trip could take as long as 10 days. In 1959, over half of the 100 bridges along the route were out because of heavy flooding during the brief spring rainy season. After construction started, Ambassador Byroade journeyed out to observe progress during the spring rainy season and spent a night on the road trapped between two normally dry stream beds (*Project* 1967; Voelker 1988).

The new highway was designed to be 10-m wide, with a 7-m paved surface and 1.5-m shoulders. A road-mix asphalt would cover the surface. The new road would have only 49 bridges, just under half as many as on the old road, but all of them of concrete. The total of 3,000 drainage structures included the bridges, multiplate pipes, and multiplate arches, using about 55,000 m of culvert. In each individual case, the design resorted to the least expensive option, although bridges were favored when costs were equal (*History* 1965; *Project* 1967; Voelker 1988).

An innovative method of bridge construction compensated for the lack of cranes and avoided free-standing form work over deep river beds. Work crews simply put earth fill in the gap through which the river flowed and built a dike up to the height of the bridge span. They then built the bridge over the dike. This method sped up the process. However, it once cost the project a portion of a bridge. Rain in the mountains filled the streambed and backed up behind the dike before digging its own channel through the earthen dam. The top of the fill sagged and so did the newly poured bridge beam that rested on it. A culvert in the dike would have saved the work. As it was, Wilhelm Voelker recalled, "it was the only concrete work we ever had to do over" (Voelker 1988).

Other aspects of the concrete work on this road also did not conform to conventional practice. Bridges were built with 1-cu yd concrete mixers, three or four of them working side by side. At first the cement that went into the mix was weighed on platform scales large enough to accommodate wheel barrows. Later, with experience with the weight of each barrow and a mix based on full bags of known weight, the mix was measured by volume. This unorthodox procedure worked well, particularly because the contractor's materials engineer and Voelker, who was the Kandahar residency's materials engineer, were always present. The two of them oversaw the quality of the mix with a procedure that was the reverse of the current process used by the Corps of Engineers. As the representative of the Corps, Voelker controlled quality, whether it was designing the mix, checking the concrete, or verifying sources of aggregate. The contractor and his helpers did what amounted to quality assurance, looking over Voelker's shoulder during the process. "But we," Voelker said, speaking of the corps, "were in control" (Voelker 1988).

Border Dispute with Pakistan

The corps hoped to get supplies for concrete and other work by road and rail from the port of Karachi through Pakistan and then by road from Chaman, across the border from Spin Baldak, to Kandahar. Afghanistan and Pakistan had in force an agreement that permitted the transit of goods from one country to the other so the supply line was long but did not appear to be a problem. Iran to the east was too far and did not have a transit agreement with Afghanistan (*Project* 1967).

Within the framework of these plans and arrangements, construction got under way during the summer of 1961. However, work soon stopped. The government of Afghanistan, scrupulously neutral in its relations with all nations except Pakistan, became involved in one of its occasional spats with its neighbor to the east. These disputes dated from the establishment of Pakistan just after World War II and helped bring on the competition between the Soviet Union and the United States in Afghanistan. The perennial issue was the Afghan claim to the border area occupied by Pathan tribesmen and known as Pashtunistan. Sometimes Afghanistan closed the border; in other cases, the Pakistanis did so. However, the road program itself added a new dimension to the traditional hostility. President Ayub Khan of Pakistan was becoming concerned that the construction of hard-surface roads to his border might make his country vulnerable to attack from the Soviet Union. This time, as the dispute flared again, Afghanistan closed the border on 5 September 1961, and overland supply from the port of Karachi stopped. Construction was only one-month old at the time (Dupree 1973; Gregorian 1969; Bradsher 1985).

Effect of Border Dispute on Construction

Of all of the problems that dogged the road, none caused more expense, frustration, and delay than the tensions between Afghanistan and Pakistan. Except for eight weeks in 1962, the border remained closed for two years. During that brief period, equipment and supplies that had been concentrated at the border were rushed across the line into Afghanistan. Overall, in addition to curtailing construction, the border closure necessitated adoption of a longer and more costly supply route, especially for food and petroleum products, through Iran. The bill for this change came to an additional $1,940,000 additional for movement of about 32,000,000 kg of supplies and materials plus another $871,000 for the delays that became necessary as a lack of supplies choked off progress (*History* 1965; *Project* 1967; Ghaus 1988).

Increased transportation costs forced modification of the construction sequence and the road's design. In July 1962 construction on segment 1 at the Kabul end was suspended because the additional transportation costs to sustain efforts on that portion and segment 2 from Kandahar would have exceeded project funds. Then, as money continued to dwindle and importation of asphalt remained a problem, the surface treatment for the middle four segments was changed from a road-mix pavement to a double-bituminous surface treatment. So instead of mixing the surface treatment and applying it, the crews sprayed asphalt, backed a truck over it, and covered it with aggregate, sprayed again, and applied a second lift of aggregate. The result

was a less durable surface but one that was easier to maintain. More important, the project saved $3,000,000 with this change, just about enough to pay for the increased costs due to the border trouble (*Project* 1967; Voelker 1988).

Resumption of Work

The interior segments of the road were built from the three camps along the route. These were about 130 km apart, at Kalat nearest to the Kandahar end, Mukur in the center, and Ghazni toward Kabul. About 1,600 Afghan employees worked on the road at any given time, along with an average of 49 Americans and 30 from third countries. The official project history painted a rosy picture of these camps, recalling that their snug and sturdy masonry structures, complete with utilities and conveniences, were sound enough for retention as maintenance bases (*Project* 1967).

However, conditions at these outposts tended to be primitive and even brutal. Voelker recalled being stranded for three weeks at Mukur when the snow in the surrounding valley was 6-m high. The rooms, with their kerosene heaters, "were damn cold." Cold or not, the lucky ones were inside. An Afghan officer, whose car was stranded in the snow, never made it to camp. According to Voelker, the wolves got him first (Voelker 1988).

The project was nearly 90% complete in September 1965, when diplomatic problems again hit the program. Pakistan, embroiled in a dispute with India over Kashmir, closed the port of Karachi again. This time the project was near enough to completion and well enough prepared that Afghanistan Highway constructors finished their work with supplies on hand. Formerly "a grueling 22-hour drive," the trip from Kabul to Kandahar could now be made in 6 hours (*Project* 1967; *Project* 1968).

In a country with less than 3,000 km of paved roads, the opening of a highway was a big deal. The dedication ceremony near Ghazni on 13 July 1966 featured speeches by King Mohammad Zahir Shah, his minister of public works, and Secretary of Agriculture Orville Freeman from the United States. The king cut the ribbon opening the road. In addition to providing an all-weather connection between the country's two largest cities, the road represented a major training ground for Afghan construction workers. All equipment operators, truck drivers, mechanics, cooks, and surveyors on the job were Afghan nationals (Cameron 1966).

When completed, the Kabul-Kandahar road connected with another highway, from Kabul to Torkham at the border with Pakistan, that had already been built between 1959 and 1961 with some American aid. This road, the portion of the Trans-Asian Highway that linked the Afghan capital to Pakistan's famed Khyber Pass 145 mi to the east, provided the most direct route between Kabul and Pakistan. Designed under a contract for the International Cooperation Administration, the road followed the gorge of the Kabul River part of the way to Jalalabad and then the border. The Afghan Army carried out most of the actual construction under the supervision of E. B. Steele, Inc., of Boise, Idaho, and the net result of their effort was reduction of the 10-hour journey by about 7 hours. However, it was so extremely steep and winding, even after improvement, that very little material for the highway construction project came into Afghanistan from Torkham. Portions of this road were even cantilevered out from the gorge walls (Messall 1963; Swan-

son 1959; Ruiz 1969). With its precarious position, sometimes perched 300 m above the river, Major Eineigl thought "a couple of well-placed guerrillas could block the road forever" (Eineigl 1980).

The Kabul-Kandahar highway was plainly the most important single part of the corps job in Afghanistan. The evolution of the structure of the area office reflected the emphasis on this road. The Afghanistan Area Office was established in Kabul in September 1960 with 26 people, grew to 52 within a year, and leveled off at about 30. Between Thurston Wheeler and the last area engineer, civilian R. E. Phelps, four military officers filled the top position. They were Lieutenant Colonel Charles M. Messall (1962–1964), Lieutenant Colonel J. G. Strange (1964–1966), Major Philip D. Weinert (1966–1967), and Major L. Russell (1967).

In 1961, residencies were established at both Kabul and Kandahar under the area office, at first named after their respective cities but redesignated the Southern Residency at Kandahar and Northern Residency at Kabul before the year was over. The larger Kandahar office had as many as four Americans in 1961 and a total staff of 25 in 1963. These oversaw construction at their respective ends of the main road. Late in the program, as construction concentrated on the center of the road, the area office moved to Ghazni. It remained there until the highway was opened.

While Americans ran the area office and residencies and Afghans performed most of the blue-collar tasks, much of the professional staff came from third countries. Voelker was from Frankfurt and had a degree in civil engineering from the state college of engineering there. His interest in archaeology led him to seek work with the Corps of Engineers, first in Iran, then later in Afghanistan. Another German engineer, Manfred Mertin, worked out of Kandahar, and the surveyors were Filipino and Greek. The assistant resident engineer was an Englishman named Arthur Chapman (Voelker 1988).

Herat-Islam Qala Highway

By the time of the ribbon cutting near Ghazni, the design of a highway linking western Afghanistan to Iran was complete and the area office moved to Herat. This road, which extended westward from Herat 120 km to Islam Qala on the Iranian border, was not in the original regional transportation program undertaken by the International Cooperation Agency and finished by AID. The need for this all-weather connection with the Iranian highway system and ultimately Iranian Persian Gulf ports became very clear during the two-year closure of the Pakistani border that began in September 1961. As a result, the Herat-Islam Qala road was included in Afghanistan's five-year plan of 1962. The United States financed the design of the road with a grant of $700,000 and underwrote construction with a 40-year low-interest loan of $7,700,000. Acting on AID's advice, the Afghan government asked the Corps of Engineers to supervise the project. Corps responsibilities included the route survey, feasibility study, design, contract award, and supervision of construction. Afghan Highway Constructors, already in the country and finishing its work on the Kabul-Kandahar road, was the only firm to bid on the project. The firm bid just over $12,000,000 but lowered its bid during negotiations to just over $8,000,000 (Ghaus 1988; *Project* 1968).

Although rain in western Afghanistan was light and intermittent, drainage structures were key components of the design. The spring rains come fast

and hard and turn the usually dry washes into high, wild rivers. Engineers dealt with this problem in a variety of ways. Flash flooding along the streams and wadis that crossed the road bed had to be considered, and 31 dip sections were constructed to pass water over the road and supplement the culverts and the nine-span reinforced concrete bridge across the Hari River. As designed, the highway was a "nearly all-weather" road, which could be expected to be open except for the few hours after rainstorms during which water rushing down the wadis crossed the dip sections (*Project* 1968).

At first the dip sections conformed to the design of those emplaced on the Kabul-Kandahar route. This design was modified to reduce the cost. On many, concrete aprons were eliminated. On some, a double bituminous surface treatment replaced the concrete altogether (*Project* 1968).

The road was finished in October 1967, about 10 months ahead of schedule, but not before rains in the spring of the year provided a severe test and forced significant modifications. The size and number of both dip sections and culverts were increased, and the construction contractor went on a seven-day week to make the changes. The completed road had 224 culverts and 5.7 km of dip sections. Like the other roads with dip sections, it was usable almost all of the time. The formal dedication was celebrated in March 1968 (*Project* 1968). The entire program, a major one by the standards of 20 years ago, cost American taxpayers over $80,000,000 in loans and grants.

Highways and Soviet Military Operations

Many observers understood the military potential of the new highway network provided by the competing superpowers (Newell 1972; Goldman 1967; Borders 1979). While most commentary emphasized the possible utility of the connections to the Soviet border, Major Eineigl noted that the total road system amounted to "a beautiful U-turn" for Soviet forces (Eineigl 1980). The Afghans themselves apparently understood the implications of the roads. Thomas Goutierre, director of the Afghan Studies program at the University of Nebraska–Omaha and once a long-time resident of Afghanistan, recalled in 1980 that the military possibilities were frequently the focus of nervous jokes during the 1960s (Goutierre 1980).

Of course, the humor became grim reality in 1979. The Soviet army used the roads built earlier by Soviet engineers to enter the country and the American highways once its forces arrived. However, the American highways did not significantly enhance the ability of the Soviet army to move around in Afghanistan. Except for a few days a year, armored military vehicles did not need the American-built roads. On the other hand, supply convoys of wheeled vehicles frequently found the highways to be more of a bottleneck than a convenience. During the decade-long war that followed the invasion, Afghan guerrillas closed the Salang highway almost at will and managed to block other roads from time to time as well. In fact, Soviet military performance was dismal until the Red Army and its Afghan clients learned to avoid the roads. When the Soviets finally withdrew their forces early in 1989, they even had to fight their way out over the Salang road. So overall the road network did not appreciably help them. On the other hand, the war had a predictably severe effect on the highways, creating extensive damage that was all the more unfortunate considering the peaceful purpose in their construction (Turbiville 1988; Jacobs 1985; Urban 1988; Bonner 1987). As

Wilhelm Voelker noted, unlike virtually all other projects completed by the Corps of Engineers in southern Asia during the 1960s, "those [roads] were totally civilian projects" (Voelker 1988).

Conclusion

The fact of Soviet use of U.S.-built highways for military operations, ironic though it may have been, does not help us understand the construction program. The keys to the program itself were the needs of Afghanistan and the imperatives of the cold war. Central to the latter was the feeling that the Soviet Union was testing American willingness to engage in economic competition. It may be said that the effort was wasted, that Afghanistan lay in the Soviet sphere of influence, and that the Soviet challenge might best have been met elsewhere. But by the standards used to measure the program before the invasion—the quality of construction, the provision of vital facilities, training of an Afghan labor force, and the improvement of the American image in Afghanistan—the program was a definite success.

Appendix. References

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