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BRIDGING AND ITS INFLUENCES IN ASIA TODAY

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Report of a lecture illustrated by a film delivered to the Royal Central Asian Society on April 22, 1953, Group-Captain H. St. Clair Smallwood, O.B.E., in the chair.

The CHAIRMAN: It is my pleasant privilege to introduce to you Mr. A. M. Hamilton, who is no stranger to the Royal Central Asian Society, having been a member for twenty-one years, so that you will realize that he is very interested in Eastern countries.

Mr. Hamilton is a New Zealander by birth and one of his many claims to fame is that in 1928 he joined the Iraq Public Works Department, during the period of the British Mandate, and built a road through Kurdistan. The Kurdish mountains in the north of Iraq were then infested with bandits and the Arab and Kurdish population were perpetually fighting each other. It was felt that policing depended on putting a good road through the country.

That road took four years to build from Arbil to the frontier of Persia, and Mr. Hamilton has told me that people used to try to lure him down to Baghdad and Basra, but he preferred, in spite of all the difficulties, his life up in those mountain areas. He has written a book, *Road through Kurdistan*, and those who have not read it should either buy it or borrow a copy from the library of the Royal Central Asian Society. The book was published in 1937 and it describes a great engineering—and social—feat.

Mr. Hamilton, in conjunction with Mr. White-Parsons of Callenders Cable Company, invented a bridge which can be transported in parts, put together with untrained labour and pushed across from opposite sides of a river to meet in the middle. This bridge has been used to a great extent in backward countries, particularly by the British but also by the French, and was used by the British Army in India and Burma during the war. I was in the Burma campaign and I know how vitally important those bridges were, being rather stronger and more permanent than a Bailey bridge. The bridge was also widely used in other parts of Asia. It was first thought of in Kurdistan, and then adopted by the Anglo-Iranian Oil Company.

Some years ago I read an obituary of Kipling by a writer in the *Morning Post* in which there was a sentence which has always remained in my mind: the writer said that Kipling described better than anybody else "the touch of duty in the bare spaces"; that, I am sure, describes the work of our lecturer, Mr. Hamilton.

ONCE had an Assyrian overseer whose English was not too perfect and who seemed to regard the words "bridge" and "British" as meaning much the same thing, so that he used a word that lay between the two and which sounded like "britsh" and meant either. Thus when he said "Things are better since the 'britsh' came" one could take it either way, and I have imagined that he thought our name was due to national bridging skill.

If so, he had reason, for wherever we moved in Iraq, on the plains or in the mountains, we built bridges: pile bridges, girder bridges, floating bridges and flying ferries. It was only when the overseer came to the plural "britshes" that I wondered if he meant our trousers entered into it also, as differing from the Eastern and being advantageous.

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Certainly, whatever else the British are held to be in Asian history, it will, I think, be conceded that they were great bridge-builders. We may even have overdone it if you look at the wave of nationalism made possible largely by improved communications in some countries, but taking the long view I do not think it is really so.

A first cousin to the bridge, structurally, is the aerohangar, and another near relation is the irrigation dam. In a talk on bridging I can only mention these other great engineering branches of air communications and irrigation, but both were put on a fundamental footing in India, Iraq, Egypt and so on. The most recently completed of the big bridges is the Howrah Bridge, Calcutta, over the Hoogly, which ranks high among the score of great bridges in the world and is made from Indian steel. Both the Irrawaddy or Ava and the Howrah bridges were designed by Rendel, Palmer and Tritton, consulting engineers, and the Howrah was erected by the Cleveland Bridge Company, Darlington.

Remember that bridges are relatively easier to destroy than to build; and it is a great tribute to our often abused administration that such communications have worked so well for so long and have been so much appreciated. In many lands where we found only broken bridges or none at all we have introduced not only bridges but a freedom of movement over them that is prized in the Western world and was so, from very ancient times, in the Eastern.

Let me quote from the Dane, Fugl-Meyer, and his book *Chinese Bridges*,* where he tells of bridges—suspension, cantilever, arch and so on—built from bamboo or hardwood or stone, old even when Marco Polo saw them. He says: "In the Buddhistic list of meritorious deeds, the building of a public bridge is one of the first mentioned, and many bridges are built in combination with temples and monasteries. One of the few methods to reconcile the Ten Judges of Hell is proof that one has contributed to the construction of a 'public bridge.'" Note "public bridge," not military bridge.

So I think that any bridge-builders in this audience—and the "British" are all, by association at least, bridge-builders—can cheer up a little and take a less pessimistic view of the future. On the above criterion we must rank *somewhere* even with the Buddhists, and surely too with the Moslems, for the old tradition of the worthiness of bridge-building reached from China to Iraq. I remember a Turcoman overseer telling me when we were building a frontier post at a place called Kani Rash that it was so named because the great Haroun al Raschid of the *Arabian Nights* built either a mosque or a bridge wherever he went in his dominions. There before us at Kani Rash was a broken bridge, which gave one the idea that there were fair communications, to some extent, all over the East in earlier times. Another similar broken bridge was in the Greater Zab Valley, which the Assyrians, perhaps the oldest Christians of all, claim to be the original Garden of Eden.

It is surprising how much we can learn from the very idea of a bridge, if we have a mind to do so. For example, our technical education on bridges today tells all about what goes *in* them—steel, rivets, concrete and

* Fugl-Meyer, H.: *Chinese Bridges*. Shanghai. 1937.

so on—but few of us in this age of specialization think enough, perhaps, about the flesh and blood that goes *on* them. To continue playing our part in Asia means knowing just that. For instance, we should not back just the apparently rich and powerful against the seemingly poor and weak, for the tables can be turned suddenly in Asia, as we now know. We have seen that happen in Persia.

At this point I will, if I may, recall an earlier address I gave to this Society many years ago entitled “The Construction of the Rowanduz Road,” which described the job I had just been in charge of—the making of a new road through the Zagros Mountains to the Persian Plateau in Azerbaijan, where it met another road constructed by the Persian Government from Tabriz, so that the road formed part of a highway from the Mediterranean to the Caspian Sea, and I hope some day it will go onward far beyond that.

Since that other lecture I have spoken a few times in discussions, though more often I have sat back and enjoyed the comfort of the Royal Society chairs while always, of course, listening attentively to the lecturer!

Though the mountain section of the Rowanduz Road was somewhat difficult to construct owing to the remarkable gorges and precipitous terrain—long a natural barrier—it proved easier than anticipated because of the help readily and generously given by the Kurdish people, who we had thought would be sure to oppose it. I would like to add a word on the influence of bridges in that part of the world because it seems to me it must be typical of the influence of bridging generally in remote places. We thought the Kurds, whom nobody had tamed—the Turks had not done very well with them and nobody else had subdued them throughout history—would oppose the building of the road. On the contrary, they did nothing of the kind. They welcomed it. Shaikh Mohamed Agha, the tribal chief of the area in which the bridge was built, was quite appreciative of the fact that the bridge was to be built. He and his men did nothing whatever to obstruct our workmen; there was not at any time any suggestion of hostility.

Thus the acceptance of the Rowanduz Road by everybody concerned, including Persia, led me to say to this Society that road-building and bridges and public works are not things needing to be forced upon people but, on the contrary, are welcomed by them. A little later in *Road through Kurdistan*, describing the work in more detail and the tribal reactions and Iraq minorities of the area, who are chiefly Assyrians and Kurds, and whose feuds were completely set aside during the course of this work, I said, perhaps jokingly, but I am now certain with an element of truth: “We felt we could go on making roads across Asia to the China Sea.”

In fact, there was only one hitch: the minor bridging required, often every mile or two—minor as compared with the great bridges I have mentioned. Usually it held us up and it was apparent we needed new methods, because the types sent to us were of fixed length and strength and would not “stretch” to suit wider rivers or contract to fit narrower ones as we came to them. Neither the World War I Army bridges we mostly used, designed originally to cross French and Belgian canals, nor the

"tailor-made" bridges we also sometimes used could alter their designed lengths and strengths.

To facilitate my work I thought it would be a good idea to try to produce a new type of bridge that, though being of light parts, would, figuratively speaking, stretch or contract at will and, having one type of universal bridge instead of several, make river crossings quicker to complete. We could not make the river fit the bridge, not even obliging Asian rivers that dried up for part of the year and then came down in sudden flood and washed our plant away for the other half, so I felt we had to make the bridge fit any river. For delay on a bridge delays the whole road work; machinery in those defiles just cannot move on.

Not only in this practical way is bridging very important. I had already noticed it meant something quite deeply moving to the people's minds, just as Meyer has said. We had joyful banquets every time a bridge was opened. I had to pay for the feasts, but it was well worth it. The opening of a bridge means trusting all those on the other side and encouraging not only distant trade but local co-operation. The bridge is thus an emblem of trust. Perhaps nothing represents man's belief in man better than a bridge. Go forward to unite, I thought, and you go forward without difficulty.

Not that bridges cannot be abused; they easily can be. I was indeed sorry that so soon after the road to Rowanduz was opened it was used for Iraq military operations against Shaikh Ahmad of Barzan. I believe this Shaikh said to his chiefs: "Bring a rope and hang me to the nearest tree, or fight with me against the machine-guns of the Arabs and the aeroplanes of the British who molest us." Yet neither he nor Shaikh Mohammed Agha was anything but helpful in the work I was doing, both on the road and on bridge construction.

The history of the Barzan tribe since then is rather a sad one. The road penetrated the walls of the Shaikh's mountain fastness, bridged his moat, and the Iraq Army came up and made the Shaikh a prisoner. Much though we have lost, there is, I think, a watchword that can carry us far in Asia again, and it is *sincerity* as to the people's welfare. Given sincerity of purpose we must in the end succeed and reap the great reward of trust.

But to return to the search for the universal or "stretchable" bridge: after my return to London an engineer colleague and myself were able to interest the Royal Engineer Board of the early thirties in two ideas in standard bridging they had not previously employed. In simple terms, they were, firstly, the building of bridges in storied or tiered construction and, secondly, providing what is called "variable section" of the bridge, so that those bridge members requiring to be stronger than others can be made so by adding identical units, and the bridge steel varies along its length.

That construction was first adopted by the Army after thorough testing, later by the Ministry of Transport for civil use, and we entered the war knowing for certain that the variable section "stretchable" bridge worked and that we were ahead of other nations with it. The first tests were carried out at the Experimental Bridging Establishment at Christchurch. I suggested to my colleague we name the bridge the "patent

collapsible," but he thought that was completely inappropriate, so we called it the "unit construction bridge." The Ministry of Transport School at Harmondsworth had this bridge put up to teach contractors how to erect an emergency bridge. A number of the bridges were used for emergencies and replacements in this country, and many more are in use in France and Holland. Incidentally, many of you probably walked over one of the bridges over York Road into the Festival of Britain.

But I want to show how making improvements to meet Asian bridging difficulties can affect Western bridging and how this bridging, after being tested out in the West, still further affects war and development in Asia. Any theory, whether put forward by people in the East or in the West, that either part of the world can be self-sufficient is utter nonsense. We interlock at all stages of technical and non-technical matters, and neither side need have any inferiority complex. I know I learned from the people in the East and I am sure they too learned from us. Thus if today we buy their fuel oil, we do give something back. It is often said we have taken a lot out of India, but add up what I have been saying about communications as only one thing and just think what India must owe us altogether.

The earliest user of unit construction bridging actually in the field was the Anglo-Iranian Oil Company, whose stocks interchanged with Army bridging during the war. There are quite a number of bridges in the oil area besides the main one over the Karun River. Some also went to Ceylon. During the war, to save British shipping and British production time my colleague and I, as a "two-man band production ministry," managed to arrange for the bridging to be made in India and South Africa, benefiting the steel industries of both countries as well as enabling bridges to be brought quickly to where they were needed in the S.E.A.C. campaign. We added a few score of large aerohangars, too, for war service both in Europe and in Asia. It was not always easy to get all this done, but we managed it in good time—by 1941-2.

A great problem arises owing to terrific flooding of the rivers, especially of that river coming out of the Himalayas to join the Brahmaputra called the Manas, which has an extent of flooding almost unknown in any other part of the world. The bridges over the Manas tributaries on the Bengal-Assam Railway have been replaced nine times in the history of the railway. When the floods come down they not only wash a bridge off its piers and abutments; they often bury everything completely under 60 ft. of silt.

About the longest-span bridge, or one of the longest, is a bridge in Holland, and again I jump from East to West because the same problem is being faced. In Holland there was destruction by the Germans on a tremendous scale. Dordrecht required the biggest of the replacement bridges of this standard type of which I know. Incidentally, that large bridge of nearly 500 tons weight is an index of the gain in the strength of bridging between World War I and World War II, the strength compared, say, with the Hopkins bridge Shaikh Mohammed Agha inspected being ten-fold.

In India the extensive S.E.A.C. stocks of this bridging have, I am sorry to say, been put to what can best be called strategic internal road-building to take Indian military forces into Kashmir without having to

use the old route through Pakistan, and presumably to control Pakistan water supplies if possible, which is not a very worthy aim. The Indian Army was able to use this S.E.A.C. bridging lying surplus at the end of the war, with considerable financial saving denied to Pakistan, but I should greatly doubt if the British Treasury has been credited with its value and that of other ex-war material Britain paid for and gave away, or sold very cheaply.

Well, there is little to add. Though in the thirties I joked about a possible Haifa-Hong Kong Road, West to East, over Asia, I do not do so now, for I see much of it on the map coming into existence. There are still formidable stretches to be made and bridged in the Hindu-Kush Mountains, in Afghanistan, Pakistan, India, Burma and China itself. If, as I have already said, we can supply not only the technical skill, which is the easy part, but also the era of peace, sincerity of purpose and co-operation between all peoples and races, which is the more difficult part, then I am sure we shall take our place in much greater schemes than we have already engaged in, and that intangible thing felt by all who have worked there, the "Spirit of Asia," will be with us.

The CHAIRMAN: Mr. Hamilton has said he will be pleased to answer questions from any member of the audience.

Mr. PHILIPS PRICE: I went down from Persia along the Rowanduz Road in 1950. Does Mr. Hamilton think that road is being looked after now? When there I did not see anybody looking to the bridges or making any repairs. There was then no sign of disrepair starting, but of course that is bound to appear after a few years.

Mr. HAMILTON: I am interested in that question and I will ask Mr. Skinner, who is with us today, to supply the answer; he was Chief Road Engineer in Iraq just after the war.

Mr. SKINNER: Up to about two years ago money was very scarce and there was a maintenance allowance for the Rowanduz Road of something like £15 per km.—a very small sum. The bridges were kept in a reasonable state of repair and about the only thing which did give trouble was expansion due to the terrific heat, the air temperature being sometimes as high as 170° F. I do not think there is really anything to fear; a certain amount of attention has been given to this road and in 1950 about 25 km. were strengthened. The non-appearance of workmen on these roads is a big problem. Indeed, they would seem to appear only when someone in authority is due to come along. It may be, of course, that Mr. Price came through from Persia after the repair work had been completed.

The CHAIRMAN: I should like you to pursue that particular line of country which Mr. Price has suggested. Can Mr. Hamilton add anything about the roads and bridges from India into Burma and from Burma into China? It will be tragic if the bridges made to join up those countries are allowed to fall into disrepair.

Mr. HAMILTON: I cannot say anything definite upon that point, but I can say that of all the countries in the world, oddly enough, Burma is the most bridge-minded country there is. Burma goes on bridging and bridging. I believe what was done militarily during the war set them an

example and from that they will develop their country enormously when they settle their internal disputes. The road from India to Burma should not be a bad one if maintained. With regard to the road leading to China, which is very mountainous—even more so than the Rowanduz Road—I would think some of the bridging that has been taking place might be along it even if just for defence. I feel pleased that the wartime standard bridge seems to have appealed to a country which obviously needs it so much in peace. I would not know whether it is a good through road into China yet. I do not think it was a very good one during the war, though it was used greatly and may well, in time, come into great use again for trade.

Mr. SKINNER: If I may return to the Rowanduz Road, I think what Mr. Price has just said bears great testimony to the work done by Mr. Hamilton. In the summer of 1950 the rail system in Persia seemed unable to stand up to the strain of traffic and it was found by the Anglo-Iranian Oil Company that the only way in which they could get deliveries of oil into northern Persia was to ship them to Basra, transport them from there by rail to Arbil and thence by road tanker through Kurdistan. For a period, something like ninety road tankers passed over this road daily, at the end of which the road was not in bad condition. This shows that the work which Mr. Hamilton did on the Rowanduz Road can even today stand up to what must be regarded as a very important operation.

Mr. PHILIPS PRICE: My remarks were not intended in any way to throw any doubt on the excellent work, which immensely impressed me, being entirely without any engineering knowledge on my part. It is wonderful to have constructed that road through that country and thereby do so much to pacify it. We all know that in Persia the position is such that money devoted by the Government for purposes of road-building does not always go to the right place, but I have a feeling that Iraq is not like that and that money assigned for a particular purpose goes to the right place. I wanted confirmation of that. I knew Iraq was not too well off financially a few years ago, but now with the agreement between the Iraq Petroleum Company and the Government I think Iraq is in a very favourable financial position and there should be no difficulty in maintaining this wonderful road.

Colonel CROCKER: Have the bridges in Burma been repaired? When I was there in 1945 I went up to Mandalay and saw a number of bridges which had been blown up. There was one big bridge destroyed on the line going to Tharrawaddy; there was also a very big bridge which had been blown up on the line to Mandalay.

Mr. HAMILTON: Were those bridges on the railway?

Colonel CROCKER: Yes, on the branch-line going up towards the Irrawaddy to a place called Tharrawaddy.

Mr. HAMILTON: My information is that they were all repaired by the military units that went up, and I had a report on various bridges that had been repaired. I am sorry that I have no photographs of the repaired bridges. I have been anxious to get some, but owing to the usual military formality I have not yet been able to do so; I believe they are in the hands of the Bridging Section of the War Office. Repair has taken a long time

in Borneo; it was done more quickly, in fact brilliantly, in Burma, where the Army just had to have the line working as soon as possible, and I am glad our Indian-made bridging was available.

As to Mr. Price's suggestion that in Persia money goes to the wrong place and does not in Iraq, I think under the careful Scottish scrutiny of Mr. Skinner no money went to the wrong place in Iraq.

Mr. LANGE: On my way through Kurdistan I drove over a very fine bridge across the Greater Zab River at Altun Keupri, which means the "Golden Bridge." Might I ask Mr. Hamilton whether that was also constructed by his company?

Mr. HAMILTON: No. I did not erect the Altun Keupri bridge. It was a military Inglis bridge and had only limited strength. Another engineer took that bridge down and put up the stronger military-type Hopkins bridge, which can take heavier vehicles. There are a great many of the Hopkins bridges in northern Iraq, including a crossing of the Tigris at Mosul; and the type has been of much value in civil use.

Colonel ROUTH: I understand that many bridges were broken down in China during the Civil War. The Chinese are trying to industrialize, and it seems to me an important factor in the industrialization whether or not communications are open even to the extent that they were in the past. Can Mr. Hamilton say what is being done in China to restore communications?

Mr. HAMILTON: On China I am somewhat ignorant. I do not even know what influence the Russians have had there; I expect they have had some. Though I have heard that some of our bridging went on to the Hong Kong-Kowloon Railway, I have no definite information about bridging in China. I have not been able to find out anything in that regard.

The CHAIRMAN: If that is the end of the questions—and it seems to be—it only remains for me to convey to Mr. Hamilton, on your behalf, our very grateful thanks for a period of most intense interest. I feel that if only due credit were given to bridge-builders, how very much would come to Mr. Hamilton. Our small thanks from this audience do not amount to much, but if the thanks could be collected of all the Eastern countries in which he has added communications and bridges, it would be a very, very large vote of thanks indeed. But as far as we are concerned we do thank you, Mr. Hamilton, for coming here and giving us this intensely interesting paper. Thank you very much indeed.

