NOTES TAKEN IN MESOPOTAMIA

February & March 1919

The following notes are the result of a 3 weeks visit in Mesopotamia, from 13th February to 5th March 1919, as one of a party of Railway officers invited to visit the country by General Marshall. They are intended merely as a record of the information obtained and impressions formed, the facts and figures cannot be guaranteed, and the latter are at best only approximate. I have not confined myself to purely railway questions, but have attempted to describe very briefly what appears to me to be the general characteristics and needs of the country on which, of course, the railway requirements must be based. The tour included Basra to Ur and Nasiriyah, also from Baghdad to Hillah and Kerbala along the Euphrates; Basra to Kut-el-Amara, Baghdad, Samarrah, Tikrit, and Baiji along the Tigris; and Baghdad to Baquba and Quizil Robat up the Diala, and on to Khanikin and Pai Tak on the trade route to Persia.

The term 'Mesopotamia', as generally used, applies to the country commencing from the head of the Persian Gulf and lying between the Arabian desert on the south and west, Asia Minor on the north, and the Persian hills on the east; but properly speaking the whole of this area from Baghdad southwards is known as Iraq. It consists of a flat alluvial plain originally deposited by, and now watered by, the Tigris and Euphrates rivers. From the very earliest days, i.e. from at least 4,000 years B.C., it has been recognised as one of the most fertile countries. It contains some of the oldest and most historically interesting ruins to be found; and the remains of ancient cities, canals and irrigation works are numerous and widely distributed. Though for many centuries the centre of civilisation and wealth, the country has been allowed, by continued mismanagement and neglect to sink to its existing condition which may be briefly summed up as a series of treeless deserts and marshes sparsely populated by nomadic Arabs, with occasional cultivated areas but few towns of any size, the only one of any real importance and wealth being Baghdad. The population is mainly Arab, and on the Persian frontier Kurds, but in the larger towns it is very mixed, there being also numbers of Jews and Armenians; and the colour of the people varies from jet black to practically white. At the time of my visit nearly the whole country was green, though I understand for most of the year it is bare and desolate. Large herds of sheep and goats are kept, also a considerable number of cattle and horses are seen. The soil is very rich, and wherever water is available good crops of wheat, barley, etc., can be grown, though at present cultivation seems to be confined to narrow strips alongside the rivers and canals. Date palms grow in profusion round most of the towns and villages on the river banks.

The climate varies between extremes of heat and cold, but for at least half the year is cool and healthy; and though the heat in the summer months is intense, the nights are said to be almost invariably cool and pleasant. Given a proper house accommodation and other necessary facilities it would probably be preferable to many parts of India. The rainfall is small, some 6 to 10 inches, and falls in the winter months only, mostly in January and February. There is none in the summer.

To develop the country, in addition to irrigation, more population is essential. The present Arab population is comparatively small, & they are generally said to be lazy,

treacherous and unreliable, but are strong, of good physique, and intelligent, and there seems no reason why, if it is made to be in their interest, they should not become good workmen. Hithero practically all work has been done by imported Indian labour, paid very high rates in addition to being given food and clothing, and the total cost of a cooly [sic] amounts to at least Rs. 50 to 60 per mensem, an impossible figure. The problem will be whether the Arab population will be sufficient and can be trained to meet requirements, or whether Indian labour will be required, and if so, whether they should be encouraged to colonise. In any case it must be accepted that for some time to come the cost of labour will be very high.

What first strikes the visitor on entering the country is the endless flat plains, and, with the exception of date palms round the towns and villages on the river banks, the total absence of any trees, also the enormous areas covered by water. The absence of trees is said to be of comparatively recent date only, and due to their being ruthlessly cut down without replacement; their total extermination is probably also due to the large herds of goats preventing seedlings having a chance. There seems to be no reason why sheesham and other varieties of trees which flourish in the Punjab should not also flourish here, and there is no question that one of the first needs of the country is a Forest Department to plant and maintain forests.

The large flooded areas and marshes are the natural result of the rivers through this flat area being uncontrolled. Both the Tigris and Euphrates, for the greater portion of the year, are comparatively sluggish; and though their general directions are fairly constant, they curve and wind about to an extraordinary extent. Unlike most Indian rivers, the main channels do not meander from year to year between wide limits but are usually well defined and permanent. This appears to be due to the material through which they run being mostly an impervious and fairly stiff clay, and it is astonishing what very small bunds will hold back spills and protect the country from being flooded.

Taking the case of the Tigris – and the conditions of the Euphrates are very similar – the grades are very flat. The level of Basra, some 70 miles from the sea, is only 6 feet, and Baghdad, some 450 miles further up, is only 110 feet, above sea level. After heavy rain, or on the melting of the snows in the hills in Persia and Asia Minor, the river comes down in high flood, with considerable velocity, 8 feet per second not being unusual, and heavily charged with silt. The sectional area of the river bed instead of increasing as it progresses, decreases; below Amara, for instance, it is very much less than at Baghdad. The result is the river tops its banks and spills broadcast over the country and into the various side channels taking off it which in their turn spill over the land further off, depositing silt and gradually raising the level of the country. It is a problem for irrigation experts how far these rivers should, and can, be straightened out and made to scour out their beds to carry off the flood water, and how far they can be controlled and their water utilised for irrigation when and where required. It seems clear that in ancient days far more was done in this direction than is at present, and it would appear to be mainly a question of the provision of irrigation experts and sufficient money at their disposal to bring practically the whole of this naturally very fertile country under intense cultivation. This would include the whole of the low lying area between the Arabian desert and the Persian

hills to the south of about Samara, and also the area on each side of the Diala south of Sheraban.

The only recent works in this direction appear to be the 'Hindia' barrage across the Euphrates above Hillah, designed by Sir William Wilcocks and completed about the time war broke out, which by raising the the river level some 12ft brings into use several old canals whose beds have become raised, also certain works on the Diala. As already stated good crops of wheat and barley are obtained in the irrigated areas, also paddy is grown in some of the marshes. Excellent fruits and vegetables are grown in many places, and probably almost anything would grow if properly cultivated.

At the present time the country is in a transient and uncertain stage. Hitherto every effort has been concentrated on defeating the Turk, i.e., in landing troops, munitions and stores, and transporting these where required. Efficiency in this direction was everything, and expense a very minor consideration. Immense sums have been expended on the Port of Basra and on railways and inland water and road motor transport. The position is now altered, the war is over and demobilisation in hand. Presumably for some time it will be necessary to maintain a considerable force in the country, but it will be a comparatively easy matter to meet the needs of this; and the main problem of the future will be to develop the country without unnecessary expenditure and to make it self-supporting as early as possible. So far as transport is concerned it will be necessary to provide and maintain a port to efficiently meet anticipated requirements, to provide a through railway line from this port to Baghdad, with possibly an extension to the Mediterranean and such other lines as may be necessary for strategic and commercial purposes, also to provide for such river or canal services as may be required, together with the railways to open up and develop the country.

As regards Port facilities, hitherto the only port of any importance has been Basra. This is on the west or the right bank of the Shett-el-Arab (the river formed by the junction of the Tigris and Euphrates), 73 miles up the river from the lower bar. The town of Basra proper lies some 2 or 3 miles back from the right bank, on the Ashar Creek. Opposite it on the river front are the old Consulates and various other buildings and the native town of Ashar. There is no in depth of water alongside here, consequently the wharves, godowns, etc., have been built at Magil, some 2 miles higher up where there is a long stretch of deep water close up to the bank. Behind this lies the railway headquarters and settlement of Makina.

When Basra was occupied by us in November 1914 there was only one jetty, where ships could come alongside, built by the Germans and now known as No. 7; beyond this all loading and unloading had to be done from barges or native boats in the stream; also the only connection with up country was by water, by river steamer or country boat. The whole of the surrounding country was liable to be flooded by spills from the Euphrates on the north and high tides from the south blown forward by the wind in both cases. Since then protective bunds have there been constructed and 7 substantial wharves (Nos. 1 to 6 and No. 11) have been built, provided with hydraulic cranes and ample railway sidings, alongside which the largest ships can be berthed; also, jetties 8 to 10 inclusive, which can accommodate barges, alongside which steamers can berth if required.

All the wharves so far built are of timber, but there appears to be no reason why they should not last for at least several years. There is plenty of suitable space to extend them if required, and extensions had actually been commenced further upstream but have now been stopped.

In addition to Basra, considerable facilities are being provided at Nahr Umr, 17 miles further up the Tigris, the highest point to which ocean going steamers can proceed. These include 2 wharves for steamers and several jetties for barges, with the necessary railway sidings, etc. I understand it is not intended to maintain this as a port for ocean going steamers.

There is, I think, little doubt that the existing facilities at Basra only are ample to meet all normal requirements for many years. The main question is whether it is the proper site for the permanent port. It is unusual for a large port for ocean going steamers to be located up the main channel of a river of the size and nature of the Shett-el-Arab which brings down a large quantity of fresh water heavily charged with silt and in which there must necessarily be two bars. Such a port is not to be found on any of the large Indian or African rivers. On the Shett-el-Arab the upper bar, a little distance below Muhamrah and 17 miles from Basra, is short but shallow. The lower bar is considerably wider and finally terminates at the mouth of the river about 73 miles from Basra. It is, I believe, impossible to get a ship of over 20ft draught over either of these bars at any period of the tide, and this alone would appear sufficient to condemn the port as the permanent outlet of a rich country. The problem is whether these bars can be entirely or partially kept down by training [draining?] works or dredging. This is a subject on which I hesitate to offer an opinion, but the conditions would seem to indicate that, if practicable at all, a sufficiently deep channel could only be maintained by constant heavy expenditure. I understand the intention of the Germans was to carry their railway to an open port at Koweyt where there is deep water, and there would appear to be no great difficulty in constructing a permanent harbour which would accommodate the largest ships, though I understand there would be some difficulty about fresh water. It will be a problem for the future administration of the country whether to maintain Basra or not. There would appear to be no difficulty in carrying the railway to Koweyt or to any other port on the coast to the west of the river. Also, though large sums have been expended at Basra on wharves, godowns, I.W.T. workshops, etc., there seems to be little of a really permanent nature, or which could not be moved.

<u>INLAND TRADE & TRANSPORT</u> - Previous to the war the means of inland transport consisted of an indifferent steamboat service on the Tigris, country craft on navigable rivers and canals, pack animals - mostly donkeys – and in some parts carts. There are no roads worthy of the name in the country, nothing but unmetalled tracks which have rain are almost impossible to wheel traffic the principall item of export has, I understand, been dates which were brought to the port by boat. Of other items wheat and grain were carried from the irrigated tracts to the trade centres by boat and cart. Piece goods, food grains, etc., were carried overland by donkeys, ponies, bullocks and carts. Pilgrims and other travellers, where no water transport, mostly walk, those are better off riding, or driving in uncomfortable looking 4-wheel carriages drawn by four horses abreast.

A considerable item of traffic is said to be corpses brought to the sacred city of Kerbala for burial, usually carried on donkeys.

There seems to be no doubt that as irrigation and cultivation extend large quantities of wheat and grain should be available for export. The provision of better facilities should also lead to a considerable development in the pilgrim traffic and in general trade with Persia.

To meet Military requirements an enormous steamboat service has been introduced during the last few years on the Tigris. River steamers, launches and barges of all descriptions and sizes have been commandeered from of all possible sources as well as new ones built in England and India. Large workshops and dockyards, etc., have also been established at Basra and other places. To control and work these a very large department, known as the 'Inland Water Transport', has been introduced, with, I was informed, over 700 officers. The facilities thus created are now considerably in excess of requirements, and are being reduced, but the river service is not yet available for public traffic. Presumably a Government flotilla of some sort will be maintained, but I understand the intention is to hand over the trade on the river to a private company who will take over such vessels, shops, etc., as they require, the remainder being got rid of as best they can, and in the circumstances this appears to me to be the best course to adopt.

A serious drawback to the country is the lack of fuel. No coal has yet been found, and imported coal is very costly. No timber exists except in the extreme north, and even there appears to be very limited. The native population have hitherto been confined to the use of reeds and brushwood for domestic purposes, brick-burning, etc. The future fuel of the country appears to be oil. The Abbadan Refinery already supplies oil fuel to river steamers and railway locomotives, it has also been successfully introduced for brick-burning and cooking. Oil engines are used for pumping for irrigation purposes, and the Arabs are readily taking to them. It is known that oil exists in several places in the country, and in the future the use of oil only in all locomotive, steamboat and other engines seems to be indicated.

<u>RAILWAYS</u> – when war broke out the only railway in the country was one built by the Germans and just opened, from Baghdad right back to Samarrah, 75 miles. This was built on the European 4' 8½" gauge. It was intended to be a portion of a through line from Constantinople to the Persian Gulf, and all was well built and equipped to a high standard. It fell into our hands, with all the rolling stock, when Baghdad and Samarrah were taken, in March and April 1917, and, though considerably damaged, was soon put into working condition again.

Though Basra was occupied in November 1914 and Qurnah and Nasiriyah in June and July 1915, no railway work was commenced by us before the summer of 1916. Since then the following lines have been built and equipped with rolling stock:-

<u>LOWER DIVISION. Metre Gauge</u> :-

(i) Basra to Nasiriyah, 140 miles, parallel to the Euphrates right bank.

(ii) A quarry branch from Zobin in (i) to Jabil Sanam, a small hill of volcanic origin, 23 miles.

(iii) An extension of (i) from Ur Junction, near Nasiriyah parallel to the Euphrates, to form the main Basra-Baghdad line. 15 miles completed and work in hand.

(iv) Basra to Amara, 109 miles, parallel to the Tigris right bank.

(v) Sidings at the ports of Basra and Nahr Umr, nearly 50 miles.

2' 6" gauge

(vi) Basra light railway, 25 miles.

UPPER DIVISION, left bank of Tigris. Metre Gauge

(vii) Kut-el-Amara to Baghdad, 105 miles, parallel to the Tigris left bank.

(viii) Baghdad to Quizil Robat and Khanikin Road, 103 miles parallel to Diala. Extension in hand Khanikin Road to Persian frontier on Quoraitu river, 30 miles.

(ix) Baghdad to new Cantonment, 6 miles, in hand.

UPPER DIVISION, RIGHT BANK. Standard 4' 8½"

(x) Baghdad to Baiji, 135 miles, parallel to Tigris right bank (includes German railway 75 miles).

(xi) Baghdad to Hillah on the Euphrates Canal, 58 miles.

(xii) Baghdad to Dhibhan on of the Euphrates, 48 miles.

2' 6" gauge

(xiii) Hillah to Kifl, 21 miles.

In addition to these, various 2' 6" gauge lines alongside both the Tigris and Diala, have been laid down and pulled up again.

The total lengths of mainline at present completed and in use are therefore:-

Lower Division	272 miles metre gauge.
	25 miles narrow gauge.
Upper Division	247 miles metre gauge on left bank of Tigris (including extensions in hand).
	241 miles standard gauge on right bank of Tigris.
	21 miles 2' 6" gauge ditto.
Total	519 miles metre gauge (including extensions in hand).
	241 miles standard gauge.
	46 miles narrow gauge.
Grand Total	806 miles.

The Basra-Nasirivah line, constructed in 1916, was the first line built by us. It was pushed on as rapidly as possible as the troops advanced, without any previous survey. The alignment is, therefore, susceptible of considerable improvement. At present it adheres to the high ground to the south of the Euphrates, no villages or cultivation are passed, and there is no usable water between the terminals. The line is unballasted and is packed with the mud except for a short length at Shaiba where it crosses a sandy ridge. It is practically a surface line without any bridges or permanent buildings, and little would be lost by realigning it. As it will probably form a portion of the Basra-Baghdad connection, it is likely to be retained and straightened out and moved nearer the river where it will tap cultivated areas and also obtain water. The line, though metre gauge, is laid with 75 lb rails on broad gauge sleepers so as to be ready for conversion to standard gauge if required. The crossing stations are about 9 miles apart, but intermediate crossing stations are provided for if required. Though this was the first line built by us it has not so far been called upon to carry a heavy traffic and at present only one train each way per day is run. An extension is in hand from Ur Junction, some 10 miles from Nasiriyah, following the right bank of the Euphrates, which it is intended to continue to Hillah, about 158 miles from Ur, to form a through connection to Baghdad. This is laid with 50 lb metre gauge material. Sufficient material is in hand for 65 miles, and up to the end of February about 15 miles had been laid. The present proposal is to utilise the material laid between Kut and Baghdad for the balance required.

The Jabil Sanam Branch is merely a quarry line laid to obtain stone. The stone is of poor quality, but, with the exception of a soft limestone brought by boats from islands on the coast, it appears to be the only source of stone south of Baghdad, and in fact with the exception of a sandy ridge at Shaiba, 10 miles from Makina, I saw nothing anywhere in that area but the everlasting mud or silt.

The Basra-Amarah line was the next line laid. In the first place a road was made, then a 2' 6" line from Qurnah to Amarah with the object of avoiding the narrows on the Tigris and relieving the river traffic on that congested length. The present line follows the alignment of these and is susceptible of considerable improvement. It also is practically a service line packed with mud, it is laid with 50 and 41¼ lb metre gauge material. A few station buildings have been built at the Basra end, but there are practically no permanent buildings, and the line may be considered of a temporary nature. Crossing stations are 4 to 5 miles apart. At Gurmat Ali it crosses the lower arm of the Euphrates near its junction with the Tigris above Magil. The river is here about 500ft wide and 60ft deep, with a tidal rise and fall of from 5 to 10ft. It is crossed by a floating pontoon bridge which, though it has done useful work, involves a much delay and is a constant source of anxiety. A satisfactory permanent crossing could apparently only be obtained here by a single span bridge, though shallower water could be obtained a few miles further upstream. The upper arm of the Euphrates is crossed at Qurnah by a timber trestle bridge with an opening span. There are various other smaller bridges over creeks and irrigation channels, but all are of a temporary nature. Connection with the river in the form of sidings to the bank with jetties, exists at Nahr Umr, which, as already stated, is at present a port for ocean going steamers, also at Qurnah, Ezra's Tomb, and the terminus Amarah. So long as the

connection with Basra depends on the floating bridge an alternative port at Nahr Umr seems necessary. At present this line forms a link in the main route up country, though it is supplemented by the river transport on the Tigris. It has carried a heavy traffic ever since its construction, and at present runs 3 or 4 trains each way daily. It seems open to question if, after demobilisation has been completed, its retention will be justified. If, as appears to be the case, the through railway will follow the Euphrates valley, a flotilla service on the Tigris would appear to be sufficient to meet requirements along its banks, provided, of course, sufficient water is left in the river after meeting irrigation requirements. It is in fact anticipated that it may be possible to dismantle this line about March 1920.

Sidings at Basra and Nahr Umr – The network of lines in the neighbourhood of Basra, Magil and Makina is the result of the necessity for meeting urgent war demands before a settled policy could be determined on. Certain further alterations are now proposed, and a very considerable quantity of permanent way material will be released. The final arrangements at Basra must, of course, depend on whether it be retained as the main port of the country or not. The yards and sidings at Nahr Umr could be considerably reduced at once, but must be retained to some extent, either until the Euphrates connection to Baghdad is completed or a reliable bridge is put across the Euphrates at Gurmat Ali.

Basra Light Railway – The main object of this line is for carrying stores, etc., between the various depots and camps round Basra. It is also used for passenger service mainly for the convenience of the troops quartered there. When demobilisation is completed it will apparently be no longer justified or required.

Kut-el-Amara – Baghdad line – This is entirely a surface line laid with 50 and 41¼ lb metre gauge material and packed with mud. It runs close to the Tigris throughout, and is liable to interruption when the latter tops its banks. There is practically no bridging on it and no works of a permanent nature. It has carried as many as 10 trains each way per day, or 1,500 tons plus personnel, into Baghdad, and is still carrying a fairly heavy traffic. The retention of this line will not be justified after demobilisation is finished, or after the Euphrates line to Baghdad is complete. As already stated, it is intended to utilise its permanent way in the latter line, and if this is done there must be an hiatus between the closing of one route and the opening of the other, when the Tigris will form the only route from el-Amara to Baghdad instead of only from Amara to Kut as at present. It is anticipated it will be possible to pull it up about July or August next.

Baghdad-Quizil Robat and Persian line – This line was commenced soon after the occupation of Baghdad to supply the troops advancing up the Diala and into Persia. In the first place a 2’ 6” line was laid parallel to the Diala for some distance towards Table Mountain. The metre gauge line as now laid is a practically surface one, with a ruling grade of 1 in 400, up to Table Mountain, mile 65, and with the exception of the Diala there is practically no bridging and no permanent buildings. The Diala is crossed at Baquba, mile 31, by a wooden trestle bridge, but a fine permanent a bridge – 4 spans of 100’ and 2 of 75’ - is nearly complete. At this place there is a large camp of some 40,000 Jelu refugees who have fled from the neighbourhood of lake Umri for our protection. Beyond Table Mountain the railway leaves the open plain and enters the Diala gorge, and is of a permanent nature. For the first 9 miles, through the Jebel Hamrim foothills, the work is

very heavy; it is then a more or less surface line to mile 88, fairly heavy from there to mile 96, open country again to mile 117, and then fairly heavy to the present terminus on the Persian frontier on the Quraitu river about mile 132, 3 miles beyond the old Persian City of Qasr-i-Shrin. Railhead has at present reached Khanikin Road, mile 103, but the line is open only up to Quizil Robat, mile 88. The Hulawan river is crossed at mile 96 by a permanent bridge, 5 spans of 60ft. The ruling grade from Table Mountain to Khanikin Road, mile 103, is 1 in 200 and with 1 in 50 beyond. The crossing stations on this line are about 9 to 12 miles apart, but intermediate ones could be interpolated if required. At present 4 trains are run each way, but up to 8 have been run so far as Table Mountain. Though constructed for military purposes there seems little doubt this line will be required permanently and will obtain a good public traffic. On the road from Quizil Robat to Khanikin and beyond there appears to be a continual stream of pack animals. A heavy traffic in pilgrims and corpses to Kerbala may also be anticipated

Beyond the frontier a fairly complete survey has, I understand, been made for a metre gauge line as far as Kermanshah, about 140 miles from the present terminus at the frontier; and a line has been obtained with 1 in 50 grade up to Sar-i-Pul, mile 148 from Baghdad, and 1 in 30, with a short length of 1 in 25, from there to the summit of the plateau, some 10 or 15 miles further on, after which it is easier again. In view, however, of the difficult nature of some of the country and the heavy grades, involved in an ascent to over 5,000 feet, further investigations will probably be considered desirable before further construction is taken in hand.

Baghdad New Cantonment line – This is merely an extension of the left bank metre gauge system to the site of a proposed new Cantonment to the north of the city, and calls for no special notice. Investigations have also been made for a bridge, or wagon ferry, over the Tigris opposite here. There appears to be no great difficulty about a bridge, but it would be a big work and would not appear to be justified at present unless the same gauge is used on both sides of the river.

Baghdad Hillah line - 4’ 8½” gauge. – this is practically a surface line laid with 75 lb rails and broad gauge sleepers. Its present object is mainly to tap the rich cultivated districts irrigated by the canal systems from the Hindia barrage, but it is intended that it should form a portion of the through route from Basra. At present there are no permanent bridges or buildings on it. As the connecting link between Ur and Hillah is being laid with metre gauge material, it will probably be found advisable to convert this length to that gauge, so as to bring the junction of the gauges to Baghdad; but if the railway is ever extended to the Mediterranean, there seems little doubt that the standard gauge will have to be carried over to the port. There is no question this line will obtain a good traffic in grain, etc., to Baghdad and the Port, which may be expected to increase rapidly as irrigation is extended, also in pilgrims and corpses to the sacred towns of Kerbela and Najif and in addition to through traffic.

Baghdad-Baiji Line The first 75 miles up to Samara consists of the German line. This is a well-built permanent line laid with flat-footed rails somewhat over 75 lbs in weight, on heavy steel trough sleepers, and ballasted throughout. Permanent station buildings, a few staff quarters at Baghdad, and an engine shed at Samarrah have been built. The engines and rolling stock appear to be of good designs. Beyond certain damages to the

rolling stock and bridges no serious damage was done to the line which has now been completely restored. Beyond Samarrah the line leaves the alluvial plain, and the country is more undulating. The extension to Baiji is laid with 75lb rails on broad gauge sleepers, unballasted, and with no permanent buildings. The distance from Baghdad to Mosul, via this route, is about 250 miles with Nisbin, the present terminus of the Turkish railway, 130 miles further on. I understand it is at present proposed to lay a narrow gauge extension some 50 or 60 miles beyond Baiji.

Baghdad to Dhibhan – this runs almost due west to Fallujah and Dibhan on the Euphrates. It is practically a surface line laid with 75 lb material, and calls for no special notice. Either this line, or that to Baiji, will presumably form a link in the eventual through connection to Europe according as to whether such connection be via the Euphrates Valley to Aleppo or Damascus, or up the Tigris via Mosul and Nisbin to Aleppo. The distance from Baghdad to Damascus via Dibhan is some 500 miles.

Permanent way material available - On the Lower Division there is some 50 miles of metre gauge track, including 10 miles which it is estimated will be pulled up from sidings at Basra and Nahr Umr. This is being used in the extension from Ur towards Hillah, and with the 15 miles already laid will provide for 65 miles of this.

On the Upper Division, there is 60 miles of old 45lb rails from East Africa, with rather more than sufficient new wooden sleepers, about 35 miles of this will be used up in the line to the Persian frontier, leaving a balance of 25 miles, 6 of which will be used in the extension to Baghdad Cantonment and 7 to 8 earmarked for the proposed wagon ferry connection above Baghdad.

Standard 4’ 8½” gauge - About 8 miles of mixed German and English track is available consisting of 75 lb rails with mixed wooden and iron sleepers.

Light Railway material – 46 miles of 21 lb (or over), track 2’ 6” gauge, is available. This will probably be utilised for a proposed extension beyond Baiji, to be supplemented with 11 miles of material promised from Egypt. There is also some 36 miles of 18 lb, 2’ 0” track which is earmarked for works and irrigation purposes.

Workshops – The main Workshops have been located at Shaiba, some 10 miles from Makina, and all heavy work has to be done there. There are smaller shops for petty repairs at Kut-el-Amara, and for the broad gauge at Baghdad west bank.

The Shaiba Shops consist of two large modern iron sheds, in which are repair, erecting, fitting, machine and boiler shops. In addition to these, smiths and carpenter shops and a small foundry have been accommodated in buildings of a temporary nature. The shops are fairly well supplied with the more essential machines, though there is no heavy machinery. The site is an excellent one, standing high up on a sandy ridge, which appears to be the only permanently dry spot in the neighbourhood of Basra

. The main stores yard is also located here, and calls for no special notice, beyond the fact that much larger quantities of the more essential materials appear to be stored there than are at present available on the Indian railways.

A considerable number of staff quarters, both for officers and workmen have been erected hear of a more or less temporary nature. Water has to be pumped up from the river at Basra into a settling tank.

So far as can be seen at present it will not be desirable to keep either the Workshops or Stores permanently at Shaiba. Their position must depend on the general railway policy to be adopted, but the Stores will probably be moved to the Port, and the Workshops to Baghdad which will be the junction of the metre and 4' 8½" gauges. Owing to the temporary nature of most of the buildings at Shaiba there would be no great loss incurred in moving the Shops from there.

General Railway position – The general railway position may now be briefly summed up. All lines yet laid, except the German line from Baghdad to Samarrah and the line from Baghdad to the Persian frontier, may be considered to be of a temporary nature and susceptible of being pulled up and removed without much loss. Practically the only staff quarters so far built are at Makina and Shaiba, and none of them are of permanent or expensive type. So far as can be seen at present the Tigris lines are likely to be abandoned, and the main connection to Baghdad to follow the Euphrates Valley, which contains the most cultivation and also appears likely to be the area to be first developed on a large scale. From an engineering point of view, however, there seems little to choose, and no really serious obstacle to a railway being constructed on any alignment between, or in the neighbourhood of, either of the rivers, except possibly a shortage of good water at any distance from a river or canal.

The chief the difficulties which have to be faced are labour, building materials, fuel and water. Water has usually to be obtained from one of the rivers or creeks, and always requires some days in a settling tank before it is fit for use. Well water when found is usually brackish. It seems, therefore, desirable that any railway should keep in the neighbourhood of rivers or canals.

Labour – As already noted, the present imported Indian labour is prohibitively costly, and under war conditions this was inevitable. To make conditions sufficiently attractive to Indian labour it will be necessary to ensure personal safety and the ordinary amenities of life. Personal safety was provided during the war by a guard of 40 to 50 Indian troops, and at the present time by an Arab Sheban guard of about 10 men, at each station. These Arab guards are paid by the Politicals and receive about Rs 25 per man p.m. The best solution of this difficult problem would appear to be to endeavour to get the Arabs themselves to take up railway work. In any case station buildings and staff quarters of suitable types are one of the first essentials on any permanent railway.

Building materials – No building stone is found except on the Persian line, which is too far away in most cases. Suitable earth for brick making is found nearly everywhere, the difficulty being fuel for burning. This can apparently be got over by the more general use of oil fuel. So far all masonry works have been made of cement concrete. Sand and gravel are not generally available and have usually to be carried long distances. Good lime could be burnt on the Persian line, and probably from the stone obtained near Basra. The old ruins show flat bricks sometimes laid in lime, but more usually in bitumen, which is found in large quantities near Hit on the Euphrates, and stone in lime mortar on the

Persian frontier. Brick-in-lime masonry will probably be found the best to adopt. There is no timber in the country, and, until it can be grown, imported timber or iron must apparently be used for roofing purposes.

Fuel - As there is no coal or firewood but are plenty of mineral oil in the country, the use of the latter is indicated wherever possible.

Rolling Stock – Metre gauge The total number of engines from India is:-

Standard mixed	48
B.B & C.I. 'A' Class passenger	12
F Class	73
O Class	1
Total	134

In addition to these, 40 new American Baldwin engines of the Mallet type have recently been received and are being erected; also 5 small tank engines were captured from the Germans, making a grand total 179.

I attach, as an Appendix, a statement given me by General Lubbock, showing his estimated requirements in engines and rolling stock in the future, from which it appears there will be an excess of 31 engines. I understand it is intended to return to India 31 of the oldest F class engines. There is little doubt these received very rough treatment at first when no good water or facilities for repairs were available, and that they have consequently been much knocked about. I fear there will be some difficulty in getting Indian railways to take them back, and probably more so in fixing values for them

. The Mallet engines had to be accepted. They do not appear to be at all a suitable type, except for use on the line to Persia on which there are heavy grades..

The statement shows that for metre gauge goods stock the number of wagons available is 3,742 against an estimated total of 3,603 required, giving a surplus of 139. It is not proposed to return any of these. Also that there are available 245 four-wheel coaching stock against estimated requirements of 309, or a shortage of 64, and a requirement of 106 bogie coaching vehicles, all of which will have to be obtained presumably by order on England. The coaching stock at present on the line is of very old types, and some new modern stock will be essential when regular train services are started. In addition to the above, there are, however, 40 bogie ambulance coaches, and it is possible these may be converted for ordinary use when no longer required for ambulance purposes.

Standard Gauge 4' 8½"

Altogether 16 German engines were captured with the lines, of which 11 have so far been repaired and put in use. 22 old L&SWR engines, 0-6-0 type , have since been obtained from England. The German engines, 2-8-0 and 2-6-0 types, appear to be large powerful engines, but are said not to be as satisfactory as the English ones, probably on account of the damage they received before they were captured.

There are in all 655 goods wagons, viz: 265 open and 390 covered. These include 50 received from the B.B. & C.I., 200 from the Calcutta Port Trust and 150 still under order from India.

With the exception of 11 ambulance bogies and 10 four-wheel composite and inspection cars, there is so far no coaching stock on the 4' 8½"gauge line.

Staff - The number of officers hitherto employed has been very large for the length of lines to be constructed and worked. The reasons for this have been:-

(i) That under war conditions no risks could be taken, and that sufficient reliable men must be available for every possible requirement.

(ii) That the number of good subordinates has been few, and officers have been required to do work usually done by them.

(iii) That a large percentage had to be maintained for casualties in the way of sickness and leave, which on account of the conditions and climate are heavy.

The staff has been obtained largely from the Indian railways, already much depleted by men joining the Army. The Indian railways, on the other hand, have also had extra work thrown on them by the war, and practically all leave has had to be stopped. So long as it was a case of national emergency, the Indian railway administrations and their officers have been willing to face the position, but now that the war is over the position is altered. The men lent to the Mesopotamian Railways … …