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G. W. C. 7440

*Reports on the practical training in England of the Assistant Engineers
posted to the Public Works Department in Notification No. 238
dated 3rd October 1882.*

M. H. ARNOTT.

Appointed Assistant Engineer, 2nd Grade.

Posted to the St. Albans Sewerage works, under Mr. J. Monsergh, C.E., where he has remained during the whole of the practical course. Has been visited three times on the works.

Works seen on the practical course.—The operations in connection with the sewerage of St. Albans were of an interesting and instructive nature. They comprised the collection and carriage of the sewerage, and its final disposal in irrigating a piece of land in the neighbourhood of the town. The works themselves were of a very good type, embodying in their details the latest ideas on the subject. The pipe trenches were mainly through chalk, the cuttings in places being over 20 feet deep. Mr. Arnott was fortunate enough to be practically employed in levelling, setting out, and measuring up on the works, and has got a good understanding of how these things should be done. There were no heavy operations in an engineering point of view, but the ordinary items of sewerage construction, pipe laying, building manholes, flushing and screening tanks, were numerous and good of their kind.

Visits to other works.—Mr. Arnott visited and made notes on the Oxford sewerage works.

Notes and general character.—Mr. Arnott's notes were full and good. He is pains-taking, steady, and industrious and interested in his work, and promises to be useful so far as his experience goes. He earned full premium for the course.

SPENCER COX.

Appointed Assistant Engineer, 2nd Grade.

Posted to the Hydraulic Engineering Company's works, Chester, where he has remained throughout the course. Has been visited three times on the works.

Work seen on the practical course.—The Hydraulic Engineering Company are makers of water-pressure machinery, engines, cranes, hoists, pumps, accumulators, and other appliances of that nature, and they make also the heavy castings required in their business. Mr. Cox has been through the different shops, working manually in some and taking notes in all; and has had good opportunities for getting a thorough grasp of the details of hydraulic machinery, and the processes involved in pattern making, moulding, and casting in iron.

Visits to other works.—Mr. Cox has not visited any other works.

Notes and general character.—His notes were not altogether satisfactory, mainly through want of completeness in the treatment of the subjects taken up. They showed an apparent lack of interest in his work. He is at present, I am afraid, deficient in industry and energy. Possibly responsible charge in India may improve him in these respects.

He did not earn full premium for his course.

GEORGE DEUCHARS.

Appointed Assistant Engineer, 2nd Grade, Fellow of Coopers Hill College.

Posted for the first half of the course to the works of Messrs. Easton and Anderson at Erith, and for the second half to the Thornton and Keighley Railway, under the engineers, Messrs. John Fraser and Sons, Leeds. Has been visited four times, twice at each place.

Work seen on the practical course.—The work in hand at Messrs. Easton and Anderson's yard while Mr. Deuchars was there was mainly the construction of compound condensing engines and spiral pumps to be used for irrigation in Egypt. The pumps were very large, capable of discharging 33,000 gallons per minute, with a 10-foot lift, and were somewhat exceptional in design. Mr. Deuchars saw a good deal of work in connection with these pumps and engines, and, in addition, went through the various shops and took notes of their details, employing his time there to good purpose.

On the Thornton and Keighley Railway he has seen an extremely heavy piece of railway work over very rough country. There are several tunnels and viaducts, with cuttings through rocks and big banks, and altogether there were exceptional opportunities for seeing good types of earthwork, brick and sandstone masonry, &c., of which Mr. Deuchars has made excellent use during his stay there.

Visits to other works.—Has visited Messrs. Westwood and Baillie's bridge yard, the Ealing and Hounslow Railway, and the Bradford Water-works, under construction.

Notes and general character.—His notes have been extremely good, full and clear. He has good abilities, is industrious and pains-taking, and is altogether a very promising young fellow. He has obtained full premium for the course.

WM. DREW.

Appointed Assistant Engineer, 2nd Grade.

Posted to Messrs. Handyside & Co., Britannia Works, Derby, where he has remained throughout the course. Has been visited twice on the works.

Work seen on the practical course.—Messrs. Handyside & Co. are well known makers of bridges, roofs, roof trusses, screw piles, bridge cylinders, and malleable cast-iron work. Mr. Drew has not merely seen these bridges put together, but has been employed in getting out quantities and designing details, and has in this way been able to get some practical acquaintance with ironwork construction. He has also seen a good deal of iron roofing, and has worked in the template shop, arranging details and seeing how the joints and fastenings are fitted and put together. He has been through, and made notes on the different shops, as well as the foundry, which is extensive and good of its kind. His foundry notes, in particular on pattern making, moulding, and casting, are extremely good, and show that he understood the various processes involved.

Visits to other works.—Has visited the Hull and Barnsley Railway works, where he has seen a good deal of bridge erection and cylinder sinking; has also visited ironworks in Derby and neighbourhood.

Notes and general character.—Mr. Drew's notes have on the whole been satisfactory, his shop notes more especially. He takes an interest in his work, and gets a good character from Messrs. Handyside as being industrious and useful. He has earned full premium for the course.

B. K. FINNIMORE.

Appointed Assistant Engineer, 2nd grade.

Posted to the Hounslow and Ealing Railway works, where he has remained for the whole of the course. Has been visited twice on the works.

Works seen on the practical course.—The Hounslow and Ealing Railway is an extension of the metropolitan system, and is throughout its length a piece of thoroughly good engineering. It is carried mainly through a chalk and gravel country, with patches of boulder clay at intervals, and does not present many difficulties in its earthwork. The works in hand, while Mr. Finnimore was on the railway, included, in addition to the earthwork, a viaduct, various road and occupation bridges, culverts, drains, platelaying and station

buildings. His opportunities for seeing various and important kinds of work were very good, and he has availed himself of them in a satisfactory manner. The viaduct was a heavy iron one over a canal and a railway, and the staging, lifting appliances, tackle, &c., employed, and the erection itself, afforded Mr. Finnimore extremely valuable experience. He has seen all the varieties of ordinary railway construction, including levelling and setting out, and should be well up in that branch of the profession.

Visits to other works.—Has visited the shops of Messrs. Easton and Anderson, and Messrs. Westwood and Baillie, the Settle and Carlisle Railway, the Thornton and Keighley Railway, the Bradford waterworks and ironworks at Middlesboro'.

Notes and general character.—Has made very good notes of what he has seen. He appears to be interested in his work, and is steady and industrious. He has earned full premium for the course.

E. R. GARDINER.

Appointed Assistant Engineer, 2nd Grade.

Posted for the first half of the course to the works of Messrs. Westwood, Baillie, & Co., Poplar, and for the second half to the Newbury and Whitechurch Railway, under the contractors, Messrs. Falkner and Tancred. Has been visited four times, twice at each place.

Work seen on the practical course.—The work in hand in Messrs. Westwood and Baillie's yard, while Mr. Gardiner was there, was mainly girder bridges for the Cape, and the various Indian State Railways, some being for considerable spans (150 feet), but most for ordinary small spans of 20 to 60 feet. These afforded him good opportunities for seeing how ironwork of that sort is manipulated and put together. There were also roof work, dock gates, and castings of different kinds. Mr. Gardiner did not actually work in the yard, but he went through the different shops, studying their details, and making good use of his time in that way.

The work on the Newbury and Whitechurch Railway consists of heavy cuttings and banks, and the ordinary road and occupation bridges. The under-bridges have brick arches and abutments, and wings of cement concrete faced with brick. Mr. Gardiner was employed by the contractors in levelling, setting out, and measuring up, and he had exceptional opportunities for seeing how such a work is carried on, the plant and appliances required, and the proper distribution of labour and cost.

Visits to other works.—Has visited Messrs. Easton and Anderson's works and the Hounslow and Ealing Railway.

Notes and general character.—Mr. Gardiner's notes were good and satisfactory, clear and complete. He is an intelligent industrious young fellow, interested in his work, steady and careful. He has been awarded full premium for his notes.

W. F. HANDCOCK.

Appointed Assistant Engineer, 2nd Grade.

Posted for the first half of the course to the Thornton and Keighley Railway under the Engineers, Messrs John Fraser and Sons, Leeds; and for the second half to the shops of Messrs. Westwood, Baillie, & Co., Poplar. Has been visited twice.

Work seen on the practical course.—The work on the Thornton and Keighley Railway is of an extremely heavy nature, the line passing through very rough country, and affording exceptional opportunities for gaining useful experience in railway engineering. The works in progress while Mr. Handcock was there included tunnels, long viaducts, rock cuttings, and heavy banks, and he has seen all description of treatment in carrying on the various operations

required for these different works. The brick and stone masonry required on the line is extensive and of a very good type, the work generally being admirably executed, and throughout very interesting and instructive.

The work in hand at Messrs Westwood and Baillie's yard during the time Mr. Handcock was there was mainly girder bridges of different sizes and types. There was also a good deal of interesting work going on in the neighbourhood, including girder erection, concrete walling, sheet and whole timber piling, &c., &c., which Mr. Handcock saw and took notes of.

Visits to other works.—Has visited the Bradford Waterworks and the Hounslow and Ealing Railway.

Notes and general character.—The notes in the first half of the course were moderately satisfactory, although in places they were wanting in detail and completeness. The latter half notes were not so good, being meagre and unfinished. Mr. Handcock is steady, but not quite so industrious and energetic as he might be. Probably Indian experience will improve him in this respect. He did not earn full premium for his course.

C. H. HUTTON.

Appointed Assistant Engineer, 2nd Grade.

Posted to the Bradford Waterworks under Mr. A. R. Binnie, C.E., the Engineer, where he has remained throughout the course. Has been visited three times on the works.

Work seen on the practical course.—On the Bradford Waterworks Mr. Hutton has been engaged in the construction of the new reservoirs at Thornton Moor and Barden, and has also seen different reservoirs in use in the system; as well as pipe laying and other operations connected with the carrying out of the water-supply in its details. The works on the new reservoirs under construction are of an extremely instructive type, the means employed to prevent leakage or percolation through the banks are novel and ingenious. A concrete trench is carried down to more or less solid rock 60 or 70 feet below the surface so as to intercept all underground springs, and a grooved and tongued joint unites this to the puddle wall in the earthen bank above. All the works are carried out with the utmost care, and the earthwork and masonry are models of what such things should be. The designs throughout are extremely good, and Mr. Hutton has had most favourable opportunities for seeing how waterworks should be designed and constructed. He has seen extensive concrete work, a good deal of masonry, steam excavators, puddling, and generally all the details of reservoir construction.

Visits to other works.—Has visited Sir William Armstrong's works at Newcastle, the Bowling Ironworks, and the Thornton and Keighley Railway.

Notes and general character.—His notes were full and satisfactory, and show commendable industry and observation on his part. He is a careful, steady fellow, who takes an interest in his work. He has earned full premium for his course.

G. H. LE MAISTRE.

Appointed Assistant Engineer, 2nd Grade.

Posted to the London, Brighton, and South Coast Railway shops at Brighton, under Mr. Stroudley, where he remained during the whole of the course. Has been visited twice on the works.

Work seen on the practical course.—Mr. Le Maistre spent the first half of the course in the works, principally in the erecting, fitting and repairing shops, working and making notes and sketches of what he saw there. He has had good opportunities for picking up a fair knowledge of the manipulation of metal work. The main feature of these works is keeping the rolling-stock of the railway in repair and turning out new engines, &c., as they are required; and he saw a good deal of this sort of work to begin with. In the second

half of the course he spent most of his time out of doors. He has seen some girder bridge erection as well as the construction of the large span circular roof at Brighton for the new station. He has also seen some railway work—earthwork and platelaying—although not on a very large scale, and has studied the system of signalling, &c., on the Brighton line and made notes on derricks and the use of tackle.

Visits to other works.—Has visited the works of the Westinghouse Brake Company and the new harbour works at Newhaven.

Notes and general character.—His notes in the first half of the course were not altogether satisfactory, being sketchy and unfinished. It appeared to me that he did not then take sufficient interest in his work. Latterly, however, he has improved and become industrious and pains-taking. Altogether, he has got together a considerable amount of valuable information. He has earned full premium for his course.

F. W. MAUNSELL.

Appointed Assistant Engineer, 2nd Grade.

Posted to the works of Sir William Armstrong & Co., at Newcastle, where he remained throughout the course. Has been visited thrice.

Work seen on the practical course.—The principal feature at Messrs. Armstrong's is (excepting the making of Artillery) hydraulic machinery of all kinds. Mr. Maunsell has worked manually in some of the shops, and made notes and sketches of what he has observed. He has seen a good deal of water-pressure machinery, pumps, and pumping engines put together, and has had some experience in erection. He has been through the various shops, including the bridge yard, where travellers, girders, &c., are put together. He has been in the foundry and made observations on the moulding and casting of iron, and has worked in the pattern shop. He has had fair opportunities for becoming acquainted with the main features of the application of water pressure to practical purposes, and has made some use of them. He has also been engaged on the Coble Dene Dock, on the Tyne, inspecting the erection of engines, pumps, and water-pressure machinery for working the gates, capstans, &c., and while there has been able to see a good deal of the dock walls, their foundations, and construction, in which concrete was freely used.

Visits to other works.—Mr. Maunsell has not visited any other works.

Notes and general character.—His notes were not considered quite satisfactory. They were too general and incomplete, and did not fully set forth their subject. They showed want of zeal or industry, being meagre and unfinished. Mr. Maunsell is steady, but I am afraid somewhat indolent at present. Possibly responsible charge may improve him in India. He did not earn full premium for his course.

C. J. O'BRIEN.

Appointed Assistant Engineer, 2nd Grade.

Posted to the Hounslow and Ealing Railway, where he has remained for the whole of the course. Has been visited twice on the works.

Work seen on the practical course.—The Hounslow and Ealing Railway is an extension of the metropolitan system, and is, throughout its length, a piece of thoroughly good engineering. It is carried mainly through a chalk and gravel country with patches of clay at intervals, and does not present many difficulties in its earthwork. The works in hand while Mr. O'Brien on the railway included a viaduct, several road and occupation bridges, culverts, drains, platelaying, and station buildings. His opportunities of seeing various and important kinds of work were very good, and he has availed himself of them in a satisfactory manner. The viaduct was a heavy iron one over a canal and railway, and the staging, plant, lifting appliances, tackle, &c., employed, and the erection itself, afforded Mr. O'Brien extremely valuable

experience. He has seen all the varieties of ordinary railway construction, including levelling and setting out, and should be, and is, I believe, well up in that branch of the profession.

Visits to other works.—Has visited the works of Messrs. Easton and Anderson and of Messrs. Westwood and Baillie, also the Settle and Carlisle Railway, the Thornton and Keighley Railway, the Bradford Waterworks, and Iron-works at Middlesboro.

Notes and general character.—Has made very good and clear notes. He takes an interest in his work; is steady, industrious, and painstaking, and promises to be a useful member of the Public Works Department. He has earned full premium for the course.

F. H. PYM.

Appointed Assistant Engineer, 2nd Grade.

Posted to the works of the Hydraulic Engineering Company at Chester, where he has remained throughout the course. Has been visited thrice on the works.

Work seen on the practical course.—The Hydraulic Engineering Company are makers of water-pressure machinery, engines, cranes, hoists, travellers, pumps, accumulators, hydraulic riveters, and other appliances of that nature, and they also make the heavy castings required in their business. Mr. Pym has seen a good deal of this work, as well as the various valves and pipe joints required to stand the heavy pressures in use. He has been through the different shops, working manually in some and taking notes in all, and has had good opportunities for getting a thorough grasp of the details of hydraulic machinery, and the processes involved in pattern-making, moulding, and casting in iron.

Visits to other works.—Mr. Pym has not visited any other works.

Notes and general character.—His notes in the first half of the course were below the average, being unfinished, and showing want of attention. Latterly, however, they have much improved, having become clear and fairly full, showing commendable industry. I doubt if, at present, he quite realises the importance of his work, as he is somewhat wanting in zeal. He is steady, and can do good work if he likes, and I hope he will prove useful in India. He earned full premium for the course.

PERCY E. RAVEN.

Appointed Assistant Engineer, 2nd Grade.

Posted to the works of Sir Wm. Armstrong & Co. at Newcastle, where he remained throughout the course. Has been visited thrice.

Work seen on the practical course.—The principal feature of the work at Messrs. Armstrong's is (excepting the making of artillery) hydraulic machinery of all kinds. Mr. Raven has worked manually in some of the shops, and made notes and sketches of what he has observed. He has seen a good deal of water pressure machinery, pumps and pumping engines put together. He had been through the various shops, including the bridge yard, where travellers, girders, &c., are fitted and set up. He has been in the foundry, and has made observations on the moulding and casting of iron, and has worked in the pattern shop. He has had fair opportunities for becoming acquainted with the main features in the application of water pressure to practical uses, and has to some extent utilised them. He has also been at the Cobb Dene Dock on the Tyne, inspecting engines, pumps, and water-pressure machinery for working the gates, capstans, &c., and also the dock walls, their foundations, and construction, in which concrete was freely used.

Visits to other works.—Mr. Raven has not visited any other works.

Notes and general character.—His notes show considerable industry and care, although they are somewhat wanting in completeness. This is probably due to his not quite realising the importance of the work on which he is

engaged, and also in part to his ignorance of what to note. He is a steady, fairly industrious fellow, who will probably improve under responsible charge in India. He has earned full premium for his course.

D. M. SCOBIE.

Appointed Assistant Engineer, 2nd Grade.

Posted to the shops of Messrs. Neilson & Co., locomotive builders, Glasgow, where he has remained throughout the course. Has been visited twice.

Work seen on the practical course.—Messrs. Neilson do a very large and varied business in locomotive building, and while Mr. Scobie was there they had in hand many different sorts and descriptions of engines for various countries and requirements. They supply a great many locomotives to the Indian railways, and Mr. Scobie took full advantage of his opportunities in observing and noting the different types of engines and their fittings. He has worked manually in the shops, and has a good practical knowledge of the manipulation of metal work, the various parts and fittings of engines, as well as how to erect and finish them. He is fairly well acquainted with everything that belongs to engines and locomotive building, the methods of work, and other practical details, having worked himself in the various shops.

Visits to other works.—Mr. Scobie has visited Dübs & Co.'s locomotive works, Glasgow.

Notes and general character.—His notes are good and above the average. They are clear and easily intelligible, and are excellent specimens of what notes on locomotive building should be. He is a hard-working, pains-taking, and industrious fellow, and will, I have no doubt, do good work in India. He has earned full premium for the course.

K. E. VERSCHOYLE.

Appointed Assistant Engineer, 2nd Grade.

Posted to the Bradford Waterworks under Mr. A. R. Binnie, C.E., the engineer, where he has remained throughout the course. Has been visited thrice.

Work seen on the practical course.—On the Bradford Waterworks Mr. Verschoyle has been engaged in the construction of the new reservoirs at Thornton Moor and Barden, and has also seen different reservoirs in use in the system, as well as pipe laying and other operations connected with the carrying out of the water-supply in its details. The works on the reservoirs under construction are of an extremely instructive type; the means employed to prevent leakage or percolation through the banks are novel and ingenious. A concrete trench is carried down to more or less solid rock 60 or 70 feet below the surface, so as to intercept all underground springs, and a grooved and tongued joint unites this to the puddle wall in the earthen bank above. All the works are carried out with the utmost care, and the earthwork and masonry are models of what such things should be. The designs throughout are extremely good, and Mr. Verschoyle has had most favourable opportunities for seeing how waterworks should be designed and constructed. He has seen extensive concrete work, a good deal of masonry, steam excavators, puddling, and generally all the details of reservoir construction.

Visits to other works.—Has visited the Bowling Ironworks and the Thornton and Keighley Railway.

Notes and general character.—His notes were full and satisfactory, and show commendable industry and observation. He is a careful steady fellow, who takes an interest in his work, and will, I hope, do good service in India; he has earned full premium for his course.

Mr. A. L. WEBB.

Appointed Assistant Engineer, 2nd Grade, Fellow of Cooper's Hill College.

Posted for the first half of the course to the works of Messrs. Easton and Anderson at Erith, and for the second half to the Newbury and Whitechurch Railway, under the contractors, Messrs. Falkiner and Tancred.

Work seen on the practical course.—The work in hand at Messrs. Easton and Anderson's yard while Mr. Webb was there was mainly the construction of compound condensing engines, and spiral pumps to be used for irrigation in Egypt. The pumps were very large, capable of discharging 33,000 gallons per minute, with a 10-foot lift, and were somewhat exceptional in design. Mr. Webb saw a good deal of work in connection with these pumps and engines, and, in addition, went through the various shops, and took notes of their details, employing his time in this way to very good purpose.

The work on the Newbury and Whitechurch Railway consists of heavy cuttings and banks, and the ordinary road and occupation bridges. The under-bridges have brick arches, the abutment and wings being of cement concrete faced with brick. Mr. Webb was employed by the contractors in setting out, levelling, and measuring up, and he had exceptional opportunities for seeing how such a work is carried on, the plant, appliances, and tackle required, and the proper distribution of labour and cost.

Visits to other works.—Has visited Messrs. Westwood and Baillie's bridge yard, and the Hounslow and Ealing Railway.

Notes and general character.—His notes have been full and clear, and extremely satisfactory. He has good abilities, is industrious and painstaking, and is altogether a very promising young fellow. He has obtained full premium for the course.

C. A. WHITE.

Appointed Assistant Engineer, 2nd Grade.

Posted to Thornton and Keighley Railway under the engineers, Messrs. John Fraser and Sons, Leeds, where he has remained for the whole of the course. Has been visited twice.

Work seen on the practical course.—The work on the Thornton and Keighley Railway is of a very heavy character through difficult country, and affords exceptional opportunities for gaining useful experience in railway engineering. The country through which the line passes is hilly and irregular, comprising clay, shale, and rock, tilted up at various angles; and in sidelong ground where the clay rests on shale great difficulty has been experienced from slips both in cuttings and under banks. Mr. White has seen all this, and the way in which the difficulties have been met and overcome; and the experience thus gained will no doubt prove very valuable. The works in progress while he was there included tunnels, long viaducts, rock cuttings, and heavy banks; and he has seen the various descriptions of treatment required in carrying on these different works. The brick and stone masonry along the line is extensive and of a very good type; the work generally being admirably executed, and throughout very interesting and instructive. Mr. White has, I believe, made good use of the opportunities he has had on the railway.

Visits to other works.—Has visited Sir William Armstrong's works at Newcastle, the Bowlings Iron works, and the Bradford Waterworks.

Notes and general character.—His notes throughout have been very good, showing an intelligent interest in his work. He is a steady, industrious young man, and will, I have no doubt, do good service in India. He has earned the full premium for the course.

N. D. LA TOUCHE, M. H. MAW, M. O. NORRIS, R. WOOLLCOMBE.

These gentlemen have undergone a two years' special training as mechanical engineers. They have had the best opportunities for obtaining a practical

insight into the construction, maintenance, and repairs of locomotives, &c., having spent their two years in the various engine and railway works in Glasgow, and at Swindon and Brighton.

They have, for the greater part of their time, worked manually in the different shops, erecting, fitting, and repairing engines. They have also been in, and made notes on the carriage shops and the foundry; and all of them have gone through a course of instruction in locomotive driving, having spent some time on the footplate of an engine, seeing how it behaves, and the repairs, &c., it requires in the running and repairing sheds. Altogether they have been carefully trained for the position of locomotive superintendents in India, their training being practical and sufficiently varied to make it complete of its kind. They have seen the best practice in the country, and working, as they did, at the business practically, they have got a good acquaintance with locomotives, their construction, repairs, and maintenance.

Notes and general character.—Their notes throughout have been satisfactory. They contain a large amount of valuable information on various types of engines, their details, fittings, and modes of erection. The men are steady, industrious young fellows, loving their work, and will, no doubt, do good service in India. They have earned full premia for the course.

A. 20 2

No. 1409 8

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

GENERAL.

To
The Secy. to the Govt of Madras
Public Works Department

Dated Simla 18 October 1882

Sir,

I am directed to forward for in-
formation copies of reports by Mr W.
P. Brodie on the work of the Assistant
Engineers from the Royal Indian Engineer-
ing College who have lately completed
their practical course in England.

I have the honor to be
Sir,
Your most obt servant

W. Sampson

Under Secy to the Govt of India

Two spare copies of reports.