GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read again the following paper :—

G.O., dated 29th July 1890, No. 1072 R., Public Works.

From the Consulting Engineer for Railways, dated Madras, 17th July 1890, No. 502.

From the Engineer-in-Chief, East Coast Railway, to the Consulting Engineer for Railways, dated Waltair, 12th July 1890, No. 1218/25.

The following, with indent No. 2, dated 12th instant, in duplicate, is forwarded for transmission to Government.

COPY of letter from the Executive Engineer, Kistna Bridge, to the Engineer-in-Chief, East Coast Railway, dated Waltair, 12th July 1890, No. 13.

I forward, in duplicate, an indent for plant and stores which I desire to obtain from England at the earliest practicable date for the Kistna bridge. It may prevent references between your office and that of Government in the Public Works Department if you forward a copy of this letter as an accompaniment of the indent, and I therefore offer the following explanations.

I have very carefully studied all the lists of surplus stores in all the Indian Railway depôts. These lists were furnished to me by the Director-General of Railways' office, so they are I think complete.

Out of these lists of surplus stores, I have made a careful selection of all articles which I think will on inspection be likely to suit me, and all such articles have been excluded from the list now submitted of English plant and stores.

I have arranged the list in order of importance of priority of arrival; and though I know that by the time the indent leaves Simla for London little time will be left for the design and erection of special plant in England, still I shall be glad if it is found possible for the first of the items to arrive at Cocanada early in November, and the others, including the wire rope and timber, as early as possible afterwards.

I should like Sir Alexander Rendel's office to know that, though I have very carefully specified for what exactly I should like to be sent, I attach greater importance to the early arrival of the articles, and more particularly of the pile drivers, mortar mills, and one at least of the portable cranes, than I do to precise compliance with my specification.

As regards the timber, I should like a selection of say 20,000 feet of 12″ × 12″ timber 40 feet and under to be sent out as early as it can be procured. The remainder may be paid for and despatched *after* April 1891. The sort of timber I want is the same as was supplied for the Sukkur bridge.

As no grant has, so far as I am aware, been allotted as yet for the Kistna bridge, I am unable to set funds aside, but the Government of India may, in forwarding the indent, set aside the sum of £8,400 which I reckon will be enough for the cost, insurance, and proportion of freight payable in England of the articles needed in 1890.

Enclosures.

Enclosure No. I to Director-General of Railways' Indent No. 10 of 1890, for stores required for the East Coast Railway, Kistna Bridge.

Specifications by Mr. F. J. E. Spring, Executive Engineer, Kistna Bridge, of the plant indented for.

Item No. 1.—Two sets diving apparatus, with fittings, complete, in all respects as per India Office Contract No. B. 127 of 1885, with this exception that a depth of 90 feet, of which 80 feet is water and 10 feet above water, may have to be reached.

Item No. 2.—High pressure multitubular boiler, 12 H.P., sufficient for the supply of steam to the pulsometer as per item No. 8 to work at 100lb. pressure, ordinarily mounted on four wheels, flanged for the metre gauge, and 2 feet diameter with steam dome, and cock for 2″ steam pipe; complete with all the usual fittings, including two safety valves (one locked), blower pipe, and donkey pump. The boiler to be left entirely uncovered.

Item No. 3.—These cranes are principally required for the well sinking. They will stand on the top of the wells during the sinking, held down thereto by the nuts which screw on top of the bond rods. The position of these bond rods is unalterable, so that it is essential that the following directions concerning the size of the frame and platform of the crane should be attended to. The underframe will be made of channel iron with corner gussets below, and a $\frac{3}{8}$″ plate all over the top. The frame will rest on the wheels and axles through pedestals bolted on the lower flange of the channels at the sides. When the crane is placed on top of a well it will be stripped of its wheels, axles and pedestals.

The holes through which the 2″ bolts pass up, which hold the frame to the masonry, will be drilled one in each of the four corners, and one in the centre of each of the long sides. There will thus be three holes at each side of the frame through the top plate of the frame. Now the position of these holes is fixed at 9′·6″ apart lengthwise, and 4′·9″ apart crosswise, centre to centre. The gauge of the line of rails on which the wheels run being 5′·6″ there are only cubic feet 5′·6″ − 4′·9″ = 0′·9″, or $4\frac{1}{2}$″ at each side, for the flange of the wheel, the clearance of the wheel, and the breadth of the channel side frame. As the two former cannot well be less than 2″, and consequently only $2\frac{1}{2}$″ remain, of which 1″ is the semi-diameter of the hole, it is clear, 1st, that the channel must be turned with its bosom or concave side inwards, and 2nd, that its flanges will have to be cut away, in part, to make room for the passage of the holding down bolts. To make up in strength for the cutting away of the flanges it is necessary to rivet wide cover strips, say 12″ × 6″ × $\frac{1}{2}$″ on the bottom flange, and on top of the platform plate, at the centre of each *side* of the frame. At the corners the top and bottom corner triangular gussets, which hold together the sole bars and the headstocks, will serve for the passage of the holding down bolts in the same way as at the sides, this duty is performed by the cover plates just referred to. The size, therefore, outside to outside, of the platform of each crane will be 5′·2″ broad and 9′·11″ long.

To aid in the steadiness of the crane sideways a piece of the same channel iron of which the frame is made will be bolted at each end of the frame 8′ long and placed back to back against the channel headstocks.

Upon this frame, and attached to it by sufficient and suitable attachments will stand the 5 ton steam crane. The boiler of the crane will as usual form the counterbalance of the load. I am very particular about the boiler, on account of the deposit of mud from the water. Whoever is the maker of the crane I prefer to get Cochran's multitubular vertical boiler, and this boiler must have four mud holes. The boiler must be supplied with a small injector and also with a small donkey pump. Its working pressure must be at least 80lb., and this it must be able to keep up continuously when in full work, with inferior coal.

The engine will be a double cylinder engine, with link motion reversing gear. A pinion in the main shaft will work directly on to the large spur wheel on the barrel, and with this gearing the crane must be capable of lifting a light load at considerable speed. When in use however for 5 ton loads the main shaft will connect with the large spur wheel of the barrel through the usual intermediate gearing, the direct motion being thrown for the time out of gear. The crane must be capable of raising the usual 5 ton load straight off the barrel, without the aid of an intermediate tackle, at the rate of as near to 15 feet per minute as the makers can get without making the boiler unduly heavy. As it will comparatively seldom be necessary to use the crane for light quick work it will not be necessary to connect the first motion and disconnect the immediate gear by a clutch. When the crane is needed for work of this sort it

ought to be possible to remove a pinion of the intermediate gearing, by unbolting it from a collar or otherwise, and then to key on a special pinion at the outer end of the main shaft where it approaches the large spur wheel of the barrel.

The crane will be capable of swinging itself horizontally in the usual manner, by the movement of a lever in the driver's hand. The break must be sufficient to allow of the load being lowered without steam, by the pressure of the driver's foot on a lever.

When remounted on its wheels the crane must be self-travelling, but the attachments of the self-traversing gear must be capable of being speedily detached whenever it is necessary to take the crane off its wheels.

The running wheels must be capable of being keyed, at will, on the same axles beneath the frame, but at the metre gauge. Their attachment therefore to their axles must be by removeable keys, and not by hydraulic pressure. The jib of the crane will be 16 feet in length, from bottom pin to centre of jib head pulley, and it will be slightly swan neck in form to allow of a high clear lift for the load. Its radius of working must vary between 8 feet and 12 feet from centre of frame.

Item No. 4.—Portable engine, 25 H.P. Multitubular locomotive boiler, working pressure 100lb., extra mud holes for very foul water. Boiler to be left without lagging, entirely uncovered and exposed all over; long firebox of Lowmoor iron for wood firing, and with two spare sets of firebars for coal burning when necessary; firebox to be well stayed, and to have an approved fusible plug, spare plugs to be supplied. Boiler to have a pump on one side and an injector on the other, both with the necessary suction and other piping: two safety valves of which one will be locked. There will be a steam jet for forcing the draught.

The engine will be of the double cylinder type, cylinder will be steam jacketed and lagged, a governor will act on a throttle valve on the steam supply pipe: ordinary plain slide valves, and no expansion valve: link motion reversing gear; shaft to be bent for the cranks: four-foot fly-wheel pulleys at both ends of shafts: in a suitable position on top of boiler will be mounted a globular wheel double junction steam stop valve for the attachment of two inch piping in the event of steam being needed elsewhere. All bearings, brasses, pins, fittings, &c., must be of the best quality supplied by the makers; all the usual tools and fittings must be supplied.

The engine will be mounted on four wrought-iron wheels of only sufficient height to allow of the ash-pan clearing the ground by six inches. The locking fore-carriage will be entirely of iron, fitted for a pole, but a pole need not be supplied, nor is a break necessary. To allow of the portable engine, being used conveniently as a stationary engine, the special casting must be supplied which takes the place of the fore-carriage and forms a tank.

The engine must be so packed that the boiler may be as light as possible entirely stripped of fittings. All studs must be efficiently protected. The wheels and fore-carriage must be packed apart from the other fittings so that they may be quickly recognized and attached when needed for the transport of the boiler when landed.

Item No. 5.—To lift 200 tons each, to a height, safely, of one foot. Hand-worked pump, for one man, with a press for the leather collars.

Item No. 6.—Two double Lencop's pulverizers, G size, with latest improvements. Two single Lencop's pulverizers, D size, with latest improvements. Four sets spare wearing parts for the above machines. Fifty pieces wire-gauze to suit the above pulverizers, cut to shape, of two sizes, 8 wires and 6 wires per inch, strong wire, iron, not galvanized. The usual netting supplied with the machines is too fine.

Item No. 7.—Two steam pile drivers of the sort of which the monkey is lifted by a pitch chain passing round the drum of a small special hoist. The machine, which will include the hoist and all iron-work, but no woodwork will be capable of driving a 40 feet pile in the ground on which it stands commencing with a blow of one foot fall. Weight of monkey one ton and a quarter. The chain will run in one direction continuously, and the monkey will be attachable to it quickly at will, when resting on the pile head, and will be detachable at any desired height by an automatic device.

The pile driver must be so fitted that it may be able to run on either the 5′·6″ gauge or the metre gauge, and if the wheels can be mounted *castor-wise* so that it can be made to run with either its side or its face forward so much the better, the winch barrel must be fitted so that the pile may be handled at will, by a separate rope or chain, but there is no objection to the pitch chain continuing to run while the pile is being handled if there is no convenient way of throwing it on to a loose pulley on the winch barrel. The winch must be capable of handling 2 tons. Special arrangements must be made for slinging the monkey either at the top or at any desired height, without risk of accident to men on the pile. The winch must be able to handle the pile, while the monkey is suspended. The running wheels must be capable of easy detachment to allow of the machine being worked in a boat. The winch also must be easily detachable and fit for use on other work. It must have link motion reversing gear, because it is not safe to handle the weight of a pile on clutch gear.

Item No. 8.—Two pulsometers No. 9 with 7″ suction and 6″ discharge pipe, with foot valve, and wrought-iron suction and delivery pipes and connection for 40 feet lift and 2 bends with each.

Item No. 9.—Special steel wire rope, for running tackle, breaking stress 135 tons square inch. Diameter of rope ¾″ giving area 0·44 square inch which means that the rope must not break before 60 tons. To this specification I require—

		£
2 ropes 500 feet long with thimble at the ends sufficiently rigged	...	92
2 „ 250 „ „ „	...	46
2 „ 200 „ „ „	...	37
2 „ 150 „ „ „	...	27

Item No. 10.—Special steel wire rope for standing rigging. Breaking stress 100 ton per square inch. Diameter of rope 1″ for use as derrick guys; these ropes will have a thimble rigged at each end of each, of sufficient size to pass a hook of the same strength as the rope—

	£
4 ropes 250 feet long	33
4 „ 225 „	31
4 „ 200 „	26

Item No. 11.—Screws 18″ to 24″ diameter forged on 2½″ diameter to 3″ diameter best wrought-iron round shank, ending on top in a ring 6″ internal diameter. In lengths as follows:—

8 screws of	6	feet long,	18″	diameter,	2½″	thick in shank.
8 „	8	„	20″	„	2⅝″	„
8 „	10	„	22″	„	2¾″	„
8 „	12	„	24″	„	3″	„

Item No. 12.—A hydraulic boiler prover of good design.

Item No. 13.—As per India Office Contract No. 973 of 1888.

Item No. 14.—One grindstone of the finest quality, mounted in trough, fitted with fast and loose pulleys for steam power, and with approved pattern of tool rest 24″ diameter.

Item No. 15.—Machine, emery, for grinding twist drills from $\frac{3}{16}$″ to 1½″ diameter, as per India Office Contract No. 1226 of 1888, with spare emery discs.

Item No. 16.—One machine, sawing, cold, same as supplied under India Office Contract No. 1066 of 1888 with spare saws.

Item No. 17.—One cold saw-sharpening machine, to be supplied by the makers of the cold sawing machine, item No. 16 of this indent.

Item No. 18.—One machine with emery discs for sharpening circular timber saws up to 36″ diameter, with spare discs.

Item No. 19.—One hundred lineal feet of shafting in 10 feet lengths 3½″ diameter, with 12 flange couplings, 12 pedestals, 12 lubricators, 6 wrought-iron wall brackets to carry the pedestals, and to project so that centre of shafting may be 18″ from wall. Wrought-iron split pulleys of the following numbers and sizes, 2 of twelve inch diameter, 4 of eighteen, 2 of twenty-four, 2 of thirty, and 2 of thirty-six inches: all pulleys to be 10″ wide in face.

Item No. 20.—Special steam hose of extra strength, to work ordinarily at 120lb. pressure, with the necessary couplings and attachments; 4 lengths of 50 feet, 1½″ diameter, and 4 lengths 50 feet, 2″ diameter.

Item No. 21.—Pitch pine timber, similar to that sent out for the Sukkur bridge in the following length and quantities:—

Size		Length.	Number.	Total length.	Cubic feet.
14″	square	50′	80	4,000 feet.	5,400
14″	„	45′	200	9,000 „	12,200
12″	„	40′	350	14,000 „	14,000
12″	„	40′	200	8,000 „	8,000
12″	„	35′	160	5,600 „	5,600
12″	„	30′	80	2,400 „	2,400
12″	„	25′	380	9,500 „	9,500
12″	„	20′	80	1,600 „	1,600
				Total, cubic feet ...	58,700

Enclosure No. II to Director-General of Railways' Indent No. 10 *of* 1890.

STATEMENT showing the order of urgency to be observed in providing the stores asked for in Director-General of Railways' Indent No. 10 of 1890 for the Kistna Bridge, East Coast Railway (*vide* extract from a letter No. 13, dated 12th July 1890, from the Executive Engineer, Kistna Bridge, to the Engineer-in-Chief, East Coast Railway, attached, Enclosure No. III).

Number borne by each item in the Indent.	Names of articles.	Number or quantity indented for.	Remarks.
7	Steam pile driver	2	These items are to be shipped in time so as to arrive at *Cocanada early in November* 1890.
4	Engine, portable, 25 H.P.	1	
6	Mortar mills	4	
3	Cranes, steam, portable, 5 ton ...	4	
19	Set of shafting and fittings	1	
10	Wire ropes, standing	12	
9	Wire ropes, running	8	
11	Mooring and guy screws	32	
2	Boiler	1	
8	Pulsometers	2	
1	Diving apparatus	2	
14	Grindstone	1	
13	Cement tester	1	These items should arrive in India *before* the 31st March 1891.
12	Boiler tester	1	
16	Sawing machine, cold	1	
17	Saw-sharpening machine, cold ...	1	
18	Saw-sharpening machine for timber saws.	1	
20	Steam hose, rubber	8	
15	Drill grinding machine	1	
5	Hydraulic jacks, 200 ton	4	
21	Pitch pine timber	58,700 feet	20,000 (40 feet and under × 12″ × 12″) cubic feet only of the timber should arrive in India *before* 31*st March* 1891 *and the balance after that date.*

Enclosure No. III to Director-General of Railways' Indent No. 10 *of* 1890.

EXTRACT from a letter No. 13, dated Waltair, 12th July 1890, from the Executive Engineer, Kistna Bridge, to the Engineer-in-Chief, East Coast Railway.

I forward, in duplicate, an indent for plant and stores which I desire to obtain from England at the earliest practicable date, for the Kistna bridge. It may prevent references between your office and that of Government in the Public Works Department, if you forward a copy of this letter as an accompaniment of the indent, and I therefore offer the following explanations.

* * * * *

I have arranged the list * in order of importance of priority of arrival, and though I know that by the time the indent leaves Simla for London little time will be left for the design and erection of special plant in England, still I shall be glad if it is found possible for the first † of the items to arrive at Cocanada early in November, and the others, including the wire rope and timber, as early as possible afterwards.

I should like Sir Alexander Rendel's office to know that, though I have very carefully specified for what exactly I should like to be sent, I attach greater importance to the early arrival of the articles, and more particularly of the pile drivers, mortar mills, and one at least of the portable cranes than I do to precise compliance with my specification.

* Enclosure No. II of Director-General of Railways' indent No. 10 of 1890.

† Items Nos. 7, 4, 6, 3 and 19 of Director-General of Railways' indent.

As regards the timber, I should like a selection of say 20,000 feet of 12″ × 12″ timber 40 feet and under to be sent out as early as it can be procured. The remainder may be paid for and despatched after April 1891.

* India Office Contract A 173, 1886.

The sort of timber I want is the same as was supplied for the Sukkur bridge.*

* * * * *

Submitted to Government for transmission to the Government of India.

2. The Engineer-in-Chief, East Coast Railway, forwards, in duplicate, indents and specifications for the plant and stores required from England for the Kistna bridge.

Order—dated 29th July 1890, No. 1072 R., Public Works.

Ordered to be forwarded to the Government of India, in continuation of this office No. 1035 R., dated 18th July 1890, forwarding plans and estimates for the Kistna bridge.

2. As the plans for the Kistna bridge are to be finally reviewed by the Consulting Engineer to the Government of India, and Mr. Spring has been ordered to Simla to explain the project, advantage might be taken of Mr. Spring's presence to review this indent also after the design for the bridge has been decided.

(Here enter No. 1073 R., dated 29th July 1890.)

(True Extract.)

(Signed) T. GRACEY, Lieut.-Colonel, R.E.,
Offg. Joint Secy. to Govt., P.W.D.,
Railway Branch.

Endorsement—dated 29th July 1890, No. 1073 R., Public Works.

Forwarded.

(By Order.)

(Signed) T. GRACEY, Lieut.-Colonel, R.E.,
Offg. Joint Secy. to Govt., P.W.D.,
Railway Branch.

Read also the following paper:—

From the Officiating Under-Secretary to the Government of India, Public Works Department (Railway Stores), to the Joint Secretary to the Government of Madras, Public Works Department, Railway Branch, dated Simla, 25th August 1890, No. 122 R.S.

With reference to your telegrams noted on the margin relative to the stores required from England for the East Coast Railway, I am directed to inform you that for financial reasons the Government

Telegrams, dated 4th and 9th July 1890.

of India has not been able to order within the current official year stores to the full extent demanded.

2. After a careful consideration of the immediate wants of the line, the Government of India transmitted to the Secretary of State on the 15th July 1890 a telegraphic requisition No. S 21. This order has been confirmed by an indent (No. 9 of 1890) from the Director-General of Railways which provides for bridgework, permanent-way materials and rolling-stock estimated to cost £388,000; and in a despatch, dated the 4th August 1890, the Secretary of State has been requested to limit sterling payments in England to £400,000. Copies of the telegraphic order and indent under reference are enclosed for your information.

3. The bridgework ordered from England is about half the total quantity demanded for the whole line, and the permanent-way materials are sufficient for about 200 miles of road to be laid with wooden sleepers, with a fair proportion of points and crossings.

4. It will be observed that flatfooted steel rails of the 70lb. section in accordance with a type recently recommended for adoption by the Consulting Engineer to the Government of India for State Railways, have been asked for instead of rails of the usual 75lb. section, and the 30 locomotives have been divided equally between the "L" and "H" classes.

5. The remainder of the stores required for construction purposes will be ordered hereafter.

6. Referring now to your No. 1073 R., dated the 29th July 1890, I am directed to transmit for the information of the Government of Madras copy of indent No. 10 of 1890, which has been forwarded to England by the Director-General of Railways under the instructions of the Government of India. This indent provides for the plant required specially for the Kistna bridge works at an estimated cost of £11,200. As, however, 38,700 cubic feet of the timber asked for therein are not to be supplied until next year, the anticipated expenditure on this indent during the current financial year is only £7,520, which, together with the estimated amount of indent No. 9 (£388,000), is within the sum of £400,000 fixed by the Government of India as the limit for English expenditure this year.

7. It will be observed that the requisition for two portable 8 horse power engines has been omitted from indent No. 10. Such engines, it is understood, are available from some new plant which is surplus on the Chaman extension of the Sind Pishin State Railway, and instructions have been issued to the Director-General of Railways to arrange for the transfer of the same to the East Coast Railway.

ENCLOSURES.

Telegram from the Viceroy, Simla, to the Secretary of State for India, London, dated 15th July 1890, No. S. 21.

In anticipation of indent please order for East Coast Railway following 5 feet 6 inch gauge railway materials. Plate girder, spans complete, 5 feet 6 inch gauge, clear span feet twenty, one hundred and fifty-five spans; forty feet, sixty-eight spans; sixty feet, fifteen spans. Triangulated girder, spans complete, 5 feet 6 inch gauge, clear span feet one hundred, spans seven; one hundred and fifty, spans twelve. Permanent-way materials quite sufficient for two hundred miles—rails, steel, flatfooted, weight per yard lb seventy, with proportionate quantity of rail fastenings and spikes for wooden sleepers, also crossings and points complete, standard 5 feet 6 inch gauge, two hundred sets, one in eight half. Rolling-stock—locomotive engines with tenders complete; class L, fifteen, class H, fifteen, wagons, ballast three hundred, brake-vans twenty, carriages first class, 5 feet 6 inch gauge, eight; carriages, second-class, 5 feet 6 inch gauge, four; and accident cranes, ten-tons, two. Total expenditure during current financial year must not exceed fifty lakhs. Further communication will be sent regarding ports to which stores may be shipped.

Enclosure to Director-General of Railwags' No. 945 S. of 6th August 1890.

INDENT No. 9 of 1890 on England for Stores required for the East Coast Railway, Standard (5′ 6″) Gauge.

I hereby certify that the stores enumerated in this indent are absolutely required for the East Coast Railway, Standard (5′ 6″) gauge, and I further certify that I have satisfied myself that they comprise the least possible quantity necessary.

Dated this 11th day of August 1890.
At Simla.

(Signed) R. A. SARGEAUNT, Lieut.-Col., R.E.,
Offg. Director-General of Railways.

NOTE—1. In cases in which a personal inspection of Books and Stores cannot be made, the portion of the certificate relating thereto should be scored through.
2. The indent should be paged, and the signature attached to the last line of the indent.
3. The enumeration of the items to be strictly according to the stores classification list published by the Director-General of Railways for general guidance.
4. All items urgently wanted should be printed in italics, and so stated in the column of remarks.
5. No stores to be included in these indents which can be advantageously procured of local manufacture, or of indigenous origin—*vide* Finance Resolution No. 185, dated 10th January 1883 [Public Works Department Circular No. XI P.W., dated 21st June 1883]. See Appendix O to Vol. 1, P.W.D. Code. All European articles must be obtained through the Secretary of State, except such as are authorized to be procured locally for reasons set forth in paragraphs 2 and 3 of the Finance Resolution.
6. When indenting for Swedish or Lowmoor iron, the purpose for which wanted should be specially stated.
7. When indenting for steel, the instructions contained in Director-General's Circular No. X, dated 20th May 1885, should be attended to.

Received by the Director-General of Stores in England, the day of 1890.

INDENT on England for Stores required for the East Coast Railway, Standard (5′ 6″) Gauge.

No.	Names of articles.	Revenues to which cost is chargeable. *	Imperial head of account or grant to which cost is chargeable. †	Established proportion.	How established proportion is calculated.	Number or quantity in Store.	Number or quantity due on previous indents.	Number or quantity now indented for.	Rate. Amount. £ s. d.	Rate. Unit.	Value. Of number or quantity due on previous indents. £	Value. Of number or quantity now indented for. £	Remarks.	Shipped or under provision.	Proposed to be provided.	Remarks by the Director-General of Stores.
	CLASS A—IRON BRIDGE WORK.	"IMPERIAL."	"CAPITAL EXPENDITURE ON PUBLIC WORKS (NOT CHARGED AGAINST REVENUE)—48. *State Railways—Construction.*"	These two columns are not applicable in the case of this Indent, as the stores are required for the construction of a new line.		*Nil.*	*Nil.*									
	GIRDER SPANS, COMPLETE, FOR BRIDGES.															
	Plate, 5′ 6″ gauge.															
	Roadway above girders.															
1	Clear span 20 feet							Spans 155	50 0 0	Span.	..	7,750	The stores herein included which were ordered in Public Works Department telegram No. S-21, dated 15th July 1890, reproduced below, should be sent to Cocanada, Vizagapatam and Gopálpur between December 1890 and March 1891 on instructions which will be sent from India from time to time. Telegram No. S-21, dated 15th July 1890. From—Viceroy, To—Secretary of State for India. "In anticipation of indent, please order for East Coast Railway following 5′ 6″ gauge railway materials. Plate girder, spans complete, 5′ 6″ gauge, clear span feet twenty, one hundred and fifty-five spans; forty feet, sixty-eight spans; sixty feet, fifteen spans. Triangulated girder, spans complete, 5′ 6″ gauge, clear span feet one hundred, spans seven; one hundred and fifty, spans twelve. Permanent-way materials quite sufficient for 200 miles—rails, steel, flatfooted, weight per yard lb 70, with proportionate quantity of rail fastenings and spikes for wooden sleepers, also crossings and points complete, standard, 5′ 6″ gauge, two hundred sets, one in eight half. Rolling-stock—Locomotive Engines with tenders complete class L, fifteen, class H, fifteen, wagons, ballast 300; brake-vans 20; carriages first class, 5′ 6″ gauge, eight; carriages, second class, 5′ 6″ gauge, four; and accident cranes, ten tons, two. Total expenditure during current financial year must not exceed fifty lakhs. Further communications will be sent regarding ports to which stores may be shipped."			
2	Do. 40 ,, ...							,, 68	150 0 0	,,	..	10,200				
3	Do. 60 ,, ...							,, 15	300 0 0	,,	..	4,500				
	Triangulated, 5′ 6″ gauge.															
	Roadway between girders.															
4	Clear span 100 feet							,, 7	1,500 0 0	,,	..	10,500				
5	Do. 150 ,, ...							,, 12	3,000 0 0	,,	..	36,000				
	Total, Class A ..							..	..	..	..	68,950				
	CLASS D—PERMANENT-WAY.															
	SUFFICIENT FOR 200 MILES.															
	NOTE.—The rails, fish-plates and fastenings are to be in accordance with annexed drawings.															
6	Bolts, fish, with nuts for rails (item No. 9).							Tons 328	16 10 0	Ton.	..	5,412				
7	Crossings, built up, for rails, steel, flat-footed, 70 lb. per yard, angle 1 in 8½.							No. 200	11 0 0	Each.	..	2,200				
8	Plates, fish, for rails (item No. 9).							Tons 1,300	8 5 0	Ton.	..	10,725				
9	Rails, steel, flat-footed, 70 lb. per yard.							,, 22,000	6 15 0	,,	..	148,500				
10	Spikes, dog, for do. do.							,, 542	15 0 0	,,	..	8,130				
11	Switches (or points), complete, length of tongue 15 feet.							Sets 200	15 0 0	Set.	..	3,000				
	Total, Class D ..							..	..	..	..	177,967				

* Imperial, Provincial, Local, Mysore, or Berar. † This column will be left blank if the charge is not debitable to the Imperial revenues.

N.B.—The last three columns to be left blank for filling up in England.

Indent on England for Stores required for the East Coast Railway, Standard (5′ 6″) Gauge—*cont.*

Number of items.	Names of articles.	Revenues to which cost is chargeable. *	Imperial head of account or Grant to which cost is chargeable. †	Established proportion.	These two columns are not applicable in the case of this Indent, as the stores are required for the construction of a new line. How established proportion is calculated.	Number or quantity in Store.	Number or quantity due on previous indents.	Number or quantity now indented for.	Rate. Amount.	Rate. Unit.	Value. Of number or quantity due on previous indents.	Value. Of number or quantity now indented for.	Remarks.	Shipped or under provision.	Proposed to be provided.	Remarks by the Director-General of Stores.
	CLASS E.—ROLLING STOCK.	"IMPERIAL."	"CAPITAL EXPENDITURE ON PUBLIC WORKS (NOT CHARGED AGAINST REVENUE)—48. *State Railways—Construction.*"						£ s. d.		£	£				
	(*a*) LOCOMOTIVES.															
12	Engines, Locomotive, with tenders, complete, class H.					*Nil.*		No. 15	2,100 0 0	Each	..	31,500				
13	Engines, Locomotive, with tenders, complete, class L.							,, 15	2,220 0 0	,,	..	33,300				
	(*b*) COACHING AND GOODS STOCK.															
	1.—*Complete vehicles.*															
	NOTE.—All ironwork, fittings with wheels and axles, axle-boxes, and springs and paint, &c., should be provided, the woodwork only will be found in India where the stock will be built.															
14	Brake-vans, Indian State Railway pattern.							No. 20	140 0 0	Each	..	2,800				
15	Carriages, 1st class, Indian State Railway pattern.							,, 8	270 0 0	,,	..	2,160				
16	Carriages, 2nd class, Indian State Railway pattern.							,, 4	220 0 0	,,	..	880				
17	Cranes, accident, 10 tons							,, 2	480 0 0	,,	..	960				
18	Wagons, ballast, Indian State Railway pattern.							,, 300	110 0 0	,,	..	33,000				
	Total, Class E ..										..	104,600				
	Total of Indent ..										..	351,517				
	Add for $\frac{4}{5}$ths sea-freight (say).										..	36,483				
	Grand Total of Indent ..										..	388,000				

(Signed) R. A. SARGEAUNT, Lieut.-Col., R.E.,
Offg. Director-General of Railways.

* Imperial, Provincial, Local, Mysore, or Berar. † This column will be left blank if the charge is not debitable to the Imperial revenues.
N.B.—The last three columns to be left blank for filling up in England.

Form B.

EAST COAST STATE RAILWAY, STANDARD (5′ 6″) GAUGE.

Summary Sheet of Indent.

Date of Indent, 11th August 1890.
Number of Indent, 9 of 1890.
Amount of Indent, £388,000.
Stores required for Capital * purposes.

Nature of bulk of Stores:—

	£
Class A.—Bridgework	68,950
„ B.—Engineers' plant	...
„ C.—Workshop machinery and heavy tools	...
„ D.—Ballast and permanent-way	177,967
„ E.—Rolling-stock :—	
(*a*)—Locomotives	64,800
(*b*)—Coaching and goods stock—	
(1)—Complete vehicles	39,800
(2)—Incomplete parts	...
Class F.—Station materials and fencing	...
„ G.—Tools and stores—	
(*a*)—Tools	...
(*b*)—Stores—	
(1)—Hardware	...
(2)—Lamps, &c.	...
(3)—Leather and India-rubber goods	...
(4)—Metals	...
(5)—Painters' stores	...
(6)—Timber	...
(7)—Fuel	...
(8)—Furniture for stations, offices, &c.	...
(9)—Cloth, clothing and equipment	...
(10)—Miscellaneous	...
(11)—Stationery	...
(12)—Drawing, mathematical and surveying instruments	...
Add for four-fifths sea-freight	36,483
Total	388,000

* "Capital" or "Revenue and Minor Construction."

Form C.

Indent No. 9 *of* 11*th August* 1890.

For Stores required for the East Coast State Railway, Standard (5′ 6″) gauge.

Description of works for which needed.	Estimate when sanctioned; and whether by the Secretary of State, or what other authority.	Whether chargeable to Capital or Revenue; and, if to Capital, whether for a new work or an extension of existing work.	From what grant provision has been made for the supply of funds to cover the cost.
Construction of a new line.	The construction of the line has been sanctioned by the Secretary of State for India, in his Lordship's Despatch No. 71, Railway, dated 3rd July 1890.	Capital; new work.	From budget grant for 1890-91, subject to the limitations noted in Railway Despatch No. 78, Railway of 4th August 1890.

I certify that the stores required under this indent are for the use of the works sanctioned as above described, and that they cannot be advantageously procured of local manufacture, or from the surplus stores of other Railways, or from the State Railway Port Reserves.

(Signed) R. A SARGEAUNT, Lt.-Col., R.E.,
Offg. Director-General of Railways.

Enclosure to Director-General of Railways' No. 1020 *S., of* 18*th August* 1890.

INDENT No. 10 OF 1890 ON ENGLAND FOR STORES REQUIRED FOR THE EAST COAST RAILWAY (KISTNA BRIDGE), STANDARD (5′ 6″) GAUGE.

I hereby certify that the stores enumerated in this indent are absolutely required for the Kistna Bridge, East Coast Railway, Standard (5′ 6″) Gauge, and I further certify that I have satisfied myself that they comprise the least possible quantity necessary.

Dated this 18th day of August 1890.
At Simla.

(Signed) R. A. SARGEAUNT, Lt.-Col., R.E.,
Offg. Director-General of Railways.

NOTE.—1. In cases in which a personal inspection of books and stores cannot be made, the portion of the certificate relating thereto should be scored through.
2. The indent should be paged, and the signature attached to the last line of the indent.
3. The enumeration of the items to be strictly according to the stores classification list published by the Director-General of Railways for general guidance.
4. All items urgently wanted should be printed in italics, and so stated in the column of remarks.
5. No stores to be included in these indents which can be advantageously procured of local manufacture, or of indigenous origin—*vide* Finance Resolution No. 185, dated 10th January 1883 [Public Works Department Circular No. XI P. W., dated 21st June 1883]. See Appendix O to Vol. 1, P. W. D. Code. All European articles must be obtained through the Secretary of State, except such as are authorized to be procured locally for reasons set forth in paragraphs 2 and 3 of the Finance Resolution.
6. When indenting for Swedish or Lowmoor iron, the purpose for which wanted should be specially stated.
7. When indenting for steel, the instructions contained in Director-General's Circular No. X, dated 20th May 1885, should be attended to.

Received by the Director-General of Stores in England, the day of 1890.

INDENT on England for Stores required for the Kistna Bridge, East Coast Railway, Standard (5′ 6″) Gauge.

Number of items.	Names of articles.	Revenues to which cost is chargeable. *	Imperial head of account or grant to which cost is chargeable. †	Established proportion.	How established proportion is calculated.	Number or quantity in Store.	Number or quantity due on previous indents.	Number or quantity now indented for.	Rate. Amount.	Rate. Unit.	Value. Of number or quantity due on previous indents.	Value. Of number or quantity now indented for.	Remarks.	Shipped or under provision.	Proposed to be provided.	Remarks by the Director-General of Stores.
									£ s. d.		£.	£				
	CLASS B—ENGINEERS' PLANT (EXCLUDING PETTY TOOLS).	"IMPERIAL."	"CAPITAL EXPENDITURE ON PUBLIC WORKS (NOT CHARGED AGAINST REVENUE)—48. *State Railways—Construction.*"	These two columns are not applicable in the case of this indent, as the stores are required for the first equipment of a new line.		*Nil.*	*Nil.*						The stores herein included should be shipped *via* the canal to Cocanada, in the order of urgency noted in Enclosure No. II to this indent.			
1	Apparatus, diving ..							Sets 2	110 0 0	Set	..	220				
2	Boiler, steam, 12 horse power, high pressure, multitubular.							No. 1	150 0 0	Each	..	150				
3	Cranes, steam, portable, 5 ton.							,, 4	560 0 0	,,	..	2,240				
4	Engine, steam, portable, 25 horse power.							,, 1	500 0 0	,,	..	500				
5	Jacks, Hydraulic, to lift 200 tons.							,, 4	20 0 0	,,	..	80				
6	Mills, mortar							,, 4	..	..	..	600				
7	Pile-drivers, steam ..							,, 2	300 0 0	Each	..	600				
8	Pulsometers							,, 2	140 0 0	,,	..	280				
9	Ropes, wire, running ..							,, 8	..	..	..	202				
10	Ropes, wire, standing ..							,, 12	..	..	..	90				
11	Screws, mooring and guy ..							,, 32	..	..	..	50				
12	Tester, boiler							,, 1	18 0 0	Each	..	18	As per specifications attached.			
13	Tester, cement							,, 1	18 0 0	,,	..	18				
	Total, Class B ..											5,048				
	CLASS C—WORKSHOP, MACHINERY AND HEAVY TOOLS.															
14	Grind-stone							No. 1	10 0 0	Each	..	10				
15	Machine, grinding, drill ..							,, 1	60 0 0	,,	..	60				
16	Machine, sawing, cold ..							,, 1	40 0 0	,,	..	40				
17	Machine, saw-sharpening, cold							,, 1	10 0 0	..	..	10				
18	Machine, saw-sharpening, for timber saws.							,, 1	10 0 0	Each	..	10				
19	Shafting and fittings, set of —							Set 1	75 0 0	Set	..	75				
	Total, Class C ..							..	..	..	..	205				

* Imperial, Provincial, Local, Mysore, or Berar.

† This column will be left blank if the charge is not debitable to the Imperial revenues.

N.B.—The last three columns to be left blank for filling up in England.

Indent on England for Stores required for the Kistna Bridge, East Coast Railway, Standard (5′ 6″) Gauge—*cont.*

Number of items.	Names of articles.	Revenues to which cost is chargeable. *	Imperial head of account or grant to which cost is chargeable. †	Established proportion.	How established proportion is calculated.	Number or quantity in Store.	Number or quantity due on previous indents.	Number or quantity now indented for.	Rate. Amount.	Rate. Unit.	Value. Of number or quantity due on previous indents.	Value. Of number or quantity now indented for.	Remarks.	Shipped or under provision.	Proposed to be provided.	Remarks by the Director-General of Stores.
	CLASS G—TOOLS AND STORES.								£ s. d.		£.	£.				
	(*b*)—STORES.															
	3.—*Leather and India-rubber goods.*															
20	Hose, India-rubber, steam, with necessary couplings and attachments—															
	1½ inch diameter ..	"IMPERIAL."	"CAPITAL EXPENDITURE ON PUBLIC WORKS (NOT CHARGED AGAINST REVENUE)—48. *State Railways—Construction.*"	These two columns are not applicable in the case of this Indent, as the stores are required for the first equipment of a new line.	*Nil.*	*Nil.*	4 lengths of 50 ft. each.	10 0 0	Each length	..	40	As per specifications attached.				
	2 inch do. ..						4 lengths of 50 ft. each.	15 0 0	,,	..	60					
	Total, Class G—*b*—3 ..						..	..	..	..	100					
	6.—*Timber.*															
21	Timber, pitch pine ..						C. feet 58,700	0 1 6	c. foot	..	4,402	*Vide* specification attached. 20,000 cubic feet of timber only to be supplied during the financial year 1890-91; the balance or 38,700 cubic feet as soon after 1st April 1891 as possible. See Enclosure No. III to this Indent.				
	Total, G—*b*—6 ..						..	..	..	..	4,402					
	Total, Class G ..						..	..	..	..	4,502					
	Total of Indent ..						..	..	..	..	9,755					
	Add for ⅛ths sea-freight (say .						..	..	..	..	1,445					
	Grand Total of Indent ..						..	..	..	..	11,200					

* Imperial, Provincial, Local, Mysore, or Berar.

† This column will be left blank if the charge is not debitable to the Imperial revenues.

N.B.—The last three columns to be left blank for filling up in England.

(Signed) R. A. SARGEAUNT, Lt.-Col., R.E.,
Offg. Director-General of Railways.

FORM B.

KISTNA BRIDGE, EAST COAST RAILWAY, STANDARD (5′ 6″) GAUGE.

Summary Sheet of Indent.

Date of Indent, 18th August 1890.
Number of Indent, 10 of 1890.
Amount of Indent, £11,200.
Stores required for Capital * purposes.

Nature of bulk of Stores—	£
Class A.—Bridgework	..
Class B.—Engineers' plant	5,048
,, C.—Workshop machinery and heavy tools	205
,, D.—Ballast and Permanent-way	..
,, E.—Rolling-stock—	..
(*a*) Locomotives	..
(*b*) Coaching and goods stock—	
1. Complete vehicles	..
2. Incomplete parts	..
Class F.—Station materials and fencing	..
,, G.—Tools and stores—	
(*a*) Tools	..
(*b*) Stores—	
(1) Hardware	..
(2) Lamps, &c.	..
(3) Leather and India-rubber goods	100
(4) Metals	..
(5) Painter's stores	..
(6) Timber	4,402
(7) Fuel	..
(8) Furniture for stations, offices, &c.	..
(9) Cloth, clothing and equipment	..
(10) Miscellaneous	..
(11) Stationery	..
(12) Drawing, mathematical and surveying instruments	..
Add for four-fifths sea-freight	1,445
Total ..	11,200

* "Capital" or "Revenue and Minor Construction."

FORM C.

Indent No. 10 *of* 18*th August* 1890.

For Stores required for the Kistna Bridge, East Coast Railway, Standard (5′ 6″) Gauge.

Description of works for which needed.	Estimate when sanctioned; and whether by the Secretary of State, or what other authority.	Whether chargeable to Capital or Revenue; and, if to Capital, whether for a new work or an extension of existing work.	From what grant provision has been made for the supply of funds to cover the cost.
First equipment of a new line under construction.	The construction of the line has been sanctioned by the Secretary of State, in his Lordship's despatch No. 71 Railway, dated 3rd July 1890.	Capital; new work.	£7,520 from budget grant for 1890-91, subject to the limitation noted in Government of India despatch No. 78 Railway, of 4th August 1890; the balance £3,680 from budget grant for 1891-92 under the authority of the Government of India, Public Works Department letter No. 110 R.S., dated 15th August 1890, to the Director-General of Railways.

I certify that the stores required under this indent are for the use of the works sanctioned as above described, and that they cannot be advantageously procured of local manufacture or from the surplus stores of other railways, or from the State Railway Port Reserves.

(Signed) R. A. SARGEAUNT, Lt.-Col., R.E.,
Offg. Director-General of Railways.

Order—dated 18th September 1890, No. 1400 R., Public Works.

Forwarded to the Consulting Engineer for Railways with reference to G.O., No. 1074 R., dated 29th July 1890, for communication to the Engineer-in-Chief, East Coast Railway.

(True Extract.)

(Signed) T. GRACEY, Lieut.-Colonel, R.E.,
Offg. Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.
" Examiner, Public Works Accounts.

Exd. J. Moses.
Spare Copies

RAILWAY.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated September, 18th.

Recd. *Encl.*

G.O., 18th Sept. 1890, No. 1400 R.

1563 R

SEPTEMBER.

Stores for the East Coast Railway

Letter from the Government of India intimating the — indented for, communicated to the Consulting Engineer for Railways.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following papers :—

Endorsement of the Government of India, Public Works Department (Railway Stores), dated Simla, 30th September 1890, No. 151 R.S.

The following with extracts from Sir A. Rendell's report, dated the 7th August 1890, is forwarded to the Joint Secretary to the Government of Madras, Public Works Department, Railway Branch, for information, in continuation of Public Works Department No. 122 R.S. of 25th August 1890.

(By Order.)

(Signed) F. B. HEBBERT,
Offg. Under-Secretary.

To the Joint Secretary to Government, Public Works Department, Railway Branch.

Enclosures.

Telegram from Viceroy, Simla, to the Secretary of State for India, London, dated 30th September 1890, No. S 39.

Letter from Director-General of Stores, dated 8th August last, East Coast Railway. Spikes should be ordered. I approve of Rendell's alteration of engines.

Extracts from Sir A. Rendell's report, dated the 7th August 1890.

* * * * * *

As it is possible that the authorities may after all decide to have metal sleepers, I would suggest that the spikes for timber sleepers be not ordered immediately, India being informed of the fact.

* * * * * *

The L. class engine is not fully approved of on either the Bengal-Nagpur or the Nizam's Railways. Its wheels are thought too small and the weight upon its wheels not sufficient to allow its tractive power to be made fully available. The Bengal-Nagpur Railway Company has therefore now ordered an engine with 6 wheels of 5 feet diameter coupled, a two wheeled bogie in front and inside cylinders, very like the engines last supplied to the Oudh and Rohilkhand Railway. The L boiler is to be retained, but the cylinders are to be compounded on the Warsdell system. I would strongly advise that 30 engines of this class should be sent out instead of 15 L's and 15 H's.

The weights on the coupled wheels will be about 13½ to 14 tons. We shall then have an engine which will do the work of either an L. or H., and shall have one type instead of two.

Order—dated 21st October 1890, No. 1563 R., Public Works.

Forwarded to the Consulting Engineer for Railways for communication to the Engineer-in-Chief, East Coast Railway, with reference to Proceedings No. 1400 R., dated 18th September 1890.

(True Extract.)

Major, R.E.,
Under-Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.
" Examiner, East Coast Railway Accounts.

Exd. A. Aubert.
Spare Copies

RAILWAY.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated October, 10th.

Recd. *Encl.*

G.O., 21st Oct. 1890, No/563 R.

OCTOBER.

Engines for the East Coast Railway

Endorsement of the Government of India forwarding extract from Sir A. Rendell's report regarding spikes for timber sleepers and — and copy of telegram from the Viceroy to the Secretary of State requesting to order the spikes and approving Sir A. Rendell's alteration of engines, forwarded to the Consulting Engineer for Railways for communication to the Engineer-in-Chief.

Extracts from Sir A. Rendell's report dated the 7th August 1890.

× × × × × ×

(6) It is possible that the Authorities may after all decide to have metal sleepers I would suggest that the spikes for timber sleepers be not ordered immediately, India being informed of the fact.

× × × × × ×

The L Class Engine is not fully approved of on either the Bengal Nagpur or the Nizam's Railways. Its wheels are thought too small and the weight upon its wheels not sufficient to allow its tractive power to be made fully available. The Bengal Nagpur Railway Company has therefore now ordered an Engine with 6 wheels of 5 feet diameter coupled, a two wheeled Bogie in front and inside cylinders, very like the Engines

last

last supplied to the Oudh and Rohilkhand Railway. The L Boiler is to be retained, but the cylinders are to be compounded on the Worsdell system. I would strongly advise that 30 Engines of this class should be sent out instead of 15 Ls and 15 Hs.

The weights on the compled wheels will be about 13½ to 14 tons, We shall then have an Engine which will do the work of either an L or H., and shall have one type instead of two

Pto Secl 95 35/90.

Secy 1/10/90

All communications should be addressed to the Secretary.

No. 151 R. S

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

RAILWAY Stores

Circular
Memo for Contributed
Memo for L.
1 & 2 W. Hs.
3/10/90

Simla, the 30th September 1890

Noted
6.10.90

The following with Extracts from Sir A. Rendel's report dated the 7th August 1890 is forwarded to the Joint Secretary to the Government of Madras Railway Branch Public Works Department for information in continuation of Public Works Department No. 122 R.S. of 25th August 1890.

By order

D. B. Hobart

Offg: Under Secretary

Secy 1/10/90

Telegram

P.W.C No. 9535.

Telegram No. 539 dated 30th September 1890

From Viceroy Simla

To Secretary of State for India London

Letter from Director General of Stores dated 8th August last East Coast Railway Spikes should be ordered I approve of Rendels alterations of Engines.

Rd 8-10-90 Encl.

G.O. 1400 R dd/ 18-9-90

A No. 1563 R dd 21st Oct/90.

H.S. 17/10/90

Forwarded to the Consulting Engineer for Railways for communication to the Engineer in Chief East Coast Railway with reference to Progs: No. 1400 R dated 18th September 1890.-

A

No. 1563 R dd 21st Oct/90.

17/10

Secy Pts. Dept

To the Consulting Engr for Rlys

Exr E. C. Rly Secd 28/10

H.S. 10-4-

R.T.

9535

Govt. of 18 Madras.

PUBLIC WORKS.

Dated 21st Oct 1890

Recd. Encl.

G.O., 21st Oct 1890, No. 1563 R.

Enquiries for the
E.C. Ry.

Read to the Govt Inspr
Mr A Rendell upon
expending spikes for
timber sleepers and
— and copy of telegram
from the Viceroy to the
Secy of State regg:
to order the spikes & approving
of Mr A Rendell's attention
of Enquiries forwd to the
Chief Engr for
Comment to the Supdg Engr

Src 21/10. 90