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MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

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*Proceedings of the Madras Government, Public Works Department,
for the month of May 1860.*

No. 107. Read the following letter from Colonel J. H. BELE, Chief Engineer, to J. D. BOURDILLON, Esq., Secretary to Government, dated Chepauk, 31st March 1860, No. 11,951:—

I have the honor to forward herewith the letters marginally noted, received from the District Engineer, Upper Godavery, submitting a Supplemental Estimate of Plant required for the Upper Godavery Navigation Works, amounting to £7,412-5-9, accompanied by a Specification as well as a Sketch of the Engines applied for.

2. It will be observed that, with the permission of the Right Honorable the Secretary of State for India, Captain Haig before leaving England, ordered for the above works Plant to the value of £2,694-14-6, a portion of which is now on its way to Madras, and that he had apprized the Secretary of State of his intention, after returning to India, to submit a Supplemental Estimate, showing what other Plant would be required for the works, after ascertaining what articles could be made up here; but on consulting Mr. Moncrieff, Superintendent of the Dowlaishwaram Workshop, the District Engineer is of opinion that almost all the Plant can be procured from England at a cheaper cost than here.

3. The present Estimate of the probable quantity of Plant required has been prepared on the understanding that operations at the two Barriers will be sanctioned for simultaneous prosecution.

4. The Estimate for the two lower Barriers, is as follows:—

At Sinterála.....	Rupées 8,45,000
At Enchampilli.....	„ 3,38,000

Deducting Rupees 39,400 from the total of the above two sums, for the outlay in the purchase of Plant, which is reckoned at 1 lac for the whole of the works (estimated at 29½ lacs) the balance available for the Sinterála and Enchampilli Barriers will be as follows:—

Sinterála.....	8,16,600
Enchampilli.....	3,26,700

5. The work at each Barrier it is expected will occupy two years; those at Sinterála possibly more; Captain Haig, therefore, considers that if 5½ lacs can be appropriated to the above projects annually for two years, 300 miles of the river may be opened for traffic in the third year, should operations be commenced at both points at the same time. He adds, that if the 5½ lacs above referred to be concentrated on one Barrier at a time, the improbability of completing the work in one working season renders it expedient to avoid the risk entailed by the freshes passing over the masonry work in the river bed in its nearly finished, or newly completed state.

6. Captain Haig anticipates that he will be able to secure the services of proper Bricklayers and Masons from Nagpore and Hyderabad, and that a deficiency in the required complement of such workmen will probably be only felt the first year of the operations, as a good number could be trained for the work in a short space of time.

7. In paragraphs 12 to 14, the District Engineer describes the purposes for which the several articles applied for are required, and the manufacturers from whom he recommends that the articles should be procured. In conclusion, he observes, that if ordered immediately, the greater part of the Plant may be expected in time for the next working season, and that it is necessary that the several manufacturers should be instructed to despatch at once, each article, as soon as ready, without waiting until they have completed their several orders.

8. As from paragraph 3 of the letter of the Madras Government to the Government of India, it appears to be the intention of Government to recommend the prosecution of the Upper Godavery works, and to obtain a special grant for the purpose; the limitations on expenditure having rendered it impracticable to provide adequately for them in the Budget of 1860-1, I consider it important that steps should be taken to procure from England the additional Plant applied for by the District Engineer in time for the next working season.

From Captain F. T. HAIG, District Engineer, Upper Godavery, to Major W. H. HORSLEY, Deputy Chief Engineer, Northern Circle, dated Camp at Dowlaishwaram, 7th March 1860, No. 25.

I have the honor to submit a Supplemental List of Plant required for the Upper Godavery Navigation Works, amounting to £7,412-5-9, with the following explanation:—

2. On the 20th September last, I addressed the Right Honorable the Secretary of State for India in Council on the subject of the Godavery Navigation, urging the necessity for immediately commencing the works required for its improvement. In reply I was informed,* that Sir Charles Wood wished me to furnish a List and Estimate of the cost of the Plant required for the works at the first or Sinterála Barrier.

3. Instead of giving this in a complete state, I submitted an emergent Estimate, amounting to £2,694-14-6 for a portion only of the Plant, and which I begged permission to order before leaving England, with a view to averting, if possible, the loss of another working season.

† Enclosure No. 2. This was sanctioned,† and I accordingly ordered the articles specified in Enclosure No. 1, a portion of which is now on its way out to Madras.

4. In a final letter‡ on the same subject, I informed the Secretary of State of my intention, after returning to India to submit a Supplemental Estimate, showing what other Plant would be required for the works, as much as possible of it to be procured in India, and the rest from England, my object being to give as large an order as possible to the Workshops at this place, which I was then under the impression were suffering from want of work.

5. After consultation, however, with Mr. Moncrieff, Superintendent of the Workshops, I am of opinion that almost the whole of the requisite Tools and Machinery can be got more cheaply from England than here, and as Mr. Moncrieff's present difficulty is not want of orders, but of hands sufficient to execute those he already has, the inducement to give a portion of the present order even at some pecuniary sacrifice, to the Workshops, disappears. I have, therefore, included in the accompanying list almost all the Plant required, and propose, with the approval of the Government, to procure it from Home.

6. I should further explain that the present Estimate is based upon the supposition that operations will be carried on at two of the Barriers simultaneously.

It, therefore, comprises larger quantities than that originally asked for, and which had reference to one Barrier only.

Supposing the requisite funds available, there can, I think, be no question as to the policy of carrying out the contemplated improvements as rapidly as is consistent with good workmanship and the security of the various structures.

While, therefore, it is not my province to determine what amount shall be annually appropriated to these works, it is my duty to recommend that provision should be made for their prosecution upon a scale not inconsistent with their efficiency, or so far as I may presume to speculate upon it, with the means at the disposal of the Government.

7. The amount of the Estimates for the two lower Barriers is:—

Sinterála	Rupees 8,45,000
Enchampilli... ..	„ 3,38,000

Deducting 1-30th or 39,400 Rupees for the amount proposed to be spent on the purchase of Plant (about 1 lac for the whole of the works estimated at 29½ lacs), the balance available for expenditure on the spot, on superintendence, labor, and materials, is 11,13,600 Rupees or 8,16,600 at Sinterála and Rupees 3,26,700 at Enchampilli.

8. The works at each Barrier will occupy two years; those at Sinterála possibly more, depending upon the supply of labor. The earth-work there would employ 3,000 men for 16 months. If, therefore, 5½ lacs can be appropriated to this project annually, 300 miles of the river may be opened for traffic in the third year, if operations are commenced at both points at once. If the whole executive strength which 5½ lacs per annum represents were concentrated upon one Barrier at a time, a delay of at least one, if not two, years would be involved, for the masonry work in the river bed is of such a kind, and will be exposed to such a trial, that under no circumstances would I run the risk of the freshes passing over it in a nearly finished or newly finished state, and the cut stone covering to the Anicuts must be laid with a degree of care that will necessarily involve much time, and which with any body of men such as could be effectually superintended, would render its completion within the limits of one working season doubtful.

On the other hand, to spread the work over a period of three years would be to expose it in its unfinished condition unnecessarily to the force of another year's floods.

9. There is thus a limit in two ways to the time within which the works should be completed. It ought not to be less than two years, nor if possible more. There is nothing to be gained by spending more than 4 lacs a year at Sinterála, and if an extra 1,60,000 Rupees per annum is available, both Barriers may be disposed of within the same period.

10. There is but one point in which I have a doubt with respect to the possibility of working at this rate, and that is whether the requisite number of Bricklayers and Masons could be procured.

Of the former alone we should require 350 at Sinterála, and 200 at Enchampilli.

That we could get that number of impostors calling themselves Bricklayers, I have no doubt. When the Anicut here was in progress, the supply of characters of this sort was unlimited.

But what number of even tolerable workmen we may reckon on, is doubtful.

I hope, however, that from the Hyderabad and Nagpore countries being quite a new field for large Engineering works, and there being but little employment of the kind throughout a vast extent of that part of India, great numbers will flock to the works, and the supply of all kinds of labor equal the demand.

In any case the deficiency would probably only be felt the first year.

It would not take long to train a large number of hands and to make as good Bricklayers of them as three-fourths of the regular craftsmen.

11. These considerations appear to me sufficiently to justify my requisition for Plant, sufficient for the simultaneous prosecution of the works at the two lower Barriers. It is better to have too much than too little, and we certainly ought to be prepared for operations on the scale mentioned.

12. The accompanying list, therefore, includes

1st. The Machines and Tools requisite for two small Workshops suited to the repairs of ordinary Contractors' Plant. This part has been drawn up with great care, with the aid of Estimates supplied to me in England by makers, and revised here. I beg to recommend that the articles therein specified should be procured from Messrs. Joshua Buckton and Co. of Leeds, in whose workmanship I have confidence, and from whose Specification the present list has been prepared.

2nd. Wheels and fittings for 70 Railway Waggon, to carry 5 tons each, 50 sets having already been ordered. Four Mortar Mills worked by steam. These I consider essential, as the saving of labor by them is very great. They have been tried here with excellent results. A five Horse-power portable Engine, which with four already ordered will make altogether five. Iron work for Cranes, Pulley Blocks and Chain. A quantity of Bar Iron.

3rd. A variety of Tools, including Spades and Wheels for Wheelbarrows, which I shall do my best to introduce in supersession of the Momaty and basket, for it seems to me almost a reproach to the Department that the latter are still endured in it.

4th. Four small Steam Engines, intended for Boats. A description of the kind required is enclosed.

13. The whole list is divided into sections according to the particular makers from whom I would wish the articles to be purchased. All these Firms have either been employed in the supply of the Plant already ordered by myself in England or by the Superintendent of the Workshops here.

It is essential that Messrs. Hawthorn of Newcastle; Messrs. Clayton and Shuttleworth of Lincoln, and the Kirkstall Forge Company of Leeds, should be employed for the articles to which their names are severally appended, as these are duplicates of those already supplied by them, and of which they alone possess the detailed specifications.

14. 5 per cent. is added, the usual allowance for packing charges on the amount of those articles which will require to be packed, and 3£ per ton for Freight.

The total amount of the Estimates is £7,112-5-9. That of the orders already given in England was £2,694-14-6, exclusive of Freight and Shipping charges. If the latter amount to 200£, the total cost of the whole of the Plant delivered at Madras or Cocanada will be £10,307-0-3, or a little over 1 lac of Rupees.

15. If ordered immediately, the greater part of the Plant may be out here in good time for next working season, but I would particularly request that the different makers may be instructed not to wait until they have completed their several orders, but to despatch at once every article, as soon as ready.

List of the Plant ordered by Captain F. T. Haig, Madras Engineers, on account of the Godavery Navigation Works.

I. From Messrs. R. and W. Hawthorn, Engineers, New Castle-on-Tyne.				
	£	s.	d.	£ s. d.
50 Sets of Wheels and Axles, with bearings for 50 Railway Waggon, at £10 per set...	500	0	0	
2 Single power Crab Winches, at 11£ each	22	0	0	
Packing the same.	0	0	0	

Total from Messrs. Hawthorn... .. 522 0 0

II. From Messrs. Clayton, Shuttleworth and Co.

	£	s.	d.	£	s.	d.
2 Eight Horse-power portable Steam Engines, complete, at £235 each...	470	0	0			
2 Steam Gauges, at £4 each ...	8	0	0			
2 Steam Whistles, at £1-5 each ...	2	10	0			
2 Extra sets of Fire Bars, at £1-1 each ...	2	2	0			
Packing the above for Export ...	16	0	0			
2 Saw Benches, 5 x 2 each, fitted with 30 Circular Saws and Rollers ...	40	0	0			
2 Extra Circular Saws of 18" diameter... ..	1	15	0			
2 Do. do. 24" do.	3	0	0			
2 Do. do. 30" do.	5	2	0			
Packing the above for Export....	2	10	0			
A five Horse-power portable Steam Engine ...	180	0	0			
1 Steam Gauge	4	0	0			
1 Whistle... ..	1	5	0			
1 Extra set of Fire Bars	0	16	0			
Packing the above for Export	5	0	0			
1 Set Pumps, with iron frame complete	50	0	0			
India Rubber Ball Valves... ..	2	10	0			
Packing the above for Export... ..	4	10	0			
3 Leather Driving Bands, 60 feet x 5 inches... ..	20	12	6			
1 Do. do. 60 feet x 4 do.	5	10	0			
Suction and discharge Pipes for Pumps... ..	2	5	0			

Total from Messrs. Clayton and Shuttleworth... 827 7 6

From the Kirkstall Forge, Iron Works Company, Leeds.

Iron work for two Wooden Travelling Cranes with Wheels and Axles and Iron work for carriages... ..	108	0	0
Iron work for 10—3 ton No. 6 Cranes.....	210	0	0
Do. 4—5 ton	96	0	0
30 Dozen Railway Shovels, at 22s. 6d. per dozen ...	33	15	0
10 Dozen Railway Spades, at 31s. per dozen... ..	15	10	0
60 Cwt. Steel of sizes, at 54s. per cwt	162	0	0
3 Tons round Iron Bar of sizes	24	0	0
60 Tons flat Bar Iron punched and countersunk, at £8-10 per ton... ..	510	0	0
2½ Tons of Spikes for Railroads... ..	70	0	0
200 Barrow Wheels... ..	25	0	0
200 Picks... ..	25	0	0

Total from Kirkstall Forge and Co. ... 1,279 5 0

From Moser and Sons, 165, High Street, Southwork.

2 Sets of 6 Iron Pulley Blocks, with 1 and 2 sheaves, at 90s... ..	9	0	0
3 do. 4 do. do. 1 and 2 45s... ..	6	15	0
2 do. 4 do. do. 70s... ..	7	0	0
½ Ton ½ inch Crane Chain, £21... ..	12	0	0
½ Ton ¾ inch do. £21-10... ..	10	15	0
½ Ton ¾ inch do. £21	10	10	0
Packing the above for Shipping... ..	1	5	0

Total from Moser and Son... 57 5 0

From Mr. Charles Good, 47, King William Street.

Eight pairs 8" Wooden Blocks, strapped, at 12s... ..	4	16	0
Ten do. 5" do. do. 7s. 6d.	3	15	0
Packing... ..	0	6	0

Total £..... 2,691 14 6

(True Copy.)

(Signed) F. T. HAIG, Captain,
District Engineer, Upper Godavery.

From GEORGE CLERK, Esq., to Captain F. T. HAIG, District Engineer, Upper Godavery, dated India Office, E. C., 20th October 1859.

I am directed by the Secretary of State for India in Council to acknowledge your letter of the 3rd instant, and in reply to convey to you authority to provide the Plant specified in the list which accompanied your letter, the cost of which you Estimate at £2,691-14-6.

You will make arrangements in communication with the Inspector General of Military Stores for the immediate shipment of the Plant for India; so that as early as possible after your return to Madras, operations may be commenced on the Godavery.

Extract from a letter from T. J. Baring, Esq., Under Secretary of State for India, to Captain Haig, dated 29th September 1859.

"Sir Charles Wood would be glad if you could furnish him, before your return to India, with a description and an Estimate, of the cost of the Plant which would have to be provided in this country for the works necessary to remove the first or Sinterala Barrier, together with any observations which you may desire to make as to the best mode of obtaining the articles required."

Copy of a letter from Captain Haig, District Engineer, Upper Godavery, to the Under Secretary of State for India, dated 12th November 1859.

1. With my letter of yesterday's date, I submitted a Statement of the Tools and Machinery which I have ordered for the Godavery Navigation Works, in accordance with the sanction conveyed in your letter of 20th ultimo, at a total cost, exclusive of Shipping Charges, of £2,691-14-6.

2. This batch of Plant is of course only an instalment of the whole quantity required for the works, if they are to be prosecuted, as I believe the Government intend, with vigor, and it was my intention to have sent in another list, showing what more would be necessary. But on consideration, I prefer postponing this until I have had an opportunity, as soon as possible, after I reach India, of ascertaining what quantity of Plant is in hand at Dowlaishwaram belonging to the Upper Godavery District, and to what extent I may rely on the Workshops at that station for the repairs and supply of Machinery and Tools for the river works.

3. Without this information I should be running the risk of ordering a considerable quantity of Plant unnecessarily, especially Workshop Tools and Machines, as Punching, Shearing, Planing, and Turning Machines, which are the most expensive items in the list. I wish too as far as possible to employ the Dowlaishwaram Workshops in order to assist in placing them on a better footing. They have rendered most important service for some years, but since the stoppage of Public Works, have suffered severely from want of orders and the consequent dismissal of many of their best Artificers. I think it probable that with the models now sent out, these shops will be able to turn out a good deal of the apparatus I should require, and some of it at a lower price than I could purchase it for here.

4. I propose, therefore, as soon as possible after my arrival, consulting with the Superintendent of the Workshops upon these points, and then sending in a Supplemental List of whatever Plant it may be necessary to order from Home.

(True Copies.)

(Signed) F. T. HAIG, Captain,
District Engineer, Upper Godavery.

Dowlaishwaram, 7th March 1860.

Supplemental List of Plant required for the Upper Godavery Navigation Works.

MACHINES AND TOOLS FOR TWO SMALL WORKSHOPS.

	£	s.	d.	£	s.	d.
2 Nine inch centre double geared screw cutting Lathes, on bed 12 feet long, fitted complete with compound slide rest, self acting for surfacing, catch and face plate, set of change wheels, top driving apparatus, screw keys, 18 inch 4 jawed screw chuck and bell chuck, 120£ each	240	0	0			
Eighty lbs. best cast steel Turning Tools, assorted.	4	0	0			
Two cwt. do. do. for making Tools 1, 1½, 1½, 1½	6	0	0	250	0	0
2 Eight inch cone speed Hand Lathes, on 6 feet bed, fitted with catch and face plate, excentric steady rest, compound slide rest, top driving apparatus, and screw keys, at 33£	66	0	0	66	0	0

4 Sets of hand screwing Tackle, from $\frac{3}{16}$ to 1 inch diameter, complete with stocks and wrenches, at 20£ each ...	£	s.	d.	£	s.	d.
2 Machines to plane 3 feet long, 2 feet wide, self acting on the horizontal, vertical and angular cuts, at 100£ each. ...	200	0	0			
Forty lbs. best cast steel Tools ...	2	0	0			
Two cwt. do. do. for Tools... ..	6	0	0	208	0	0
2 Twelve inch centre double geared portable Drilling Machine, with circular rising table, self acting for boring, and fitted with 3 boring bars and bushes for table, at 58£ ...	116	0	0			
Two sets of best steel Drills from $1\frac{1}{2}$ to $2\frac{1}{2}$...	5	0	0			
Two sets of do. do. Rose bits $\frac{3}{8}$ to $2\frac{1}{2}$...	29	0	0			
Quarter cwt. best steel for Cutters ...	1	0	0	151	0	0

2 Machines to punch and shear $\frac{5}{8}$ " iron 16 inches from the edge, fitted with $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, and $\frac{5}{8}$ " punches and dies, and 2 pairs of best cast steel shears, at 75£ ...	150	0	0	150	0	0
1 Surface Master Plate, 2 feet by 16 inches... ..	5	0	0	5	0	0
3 Grinding Stones, 4 feet by 10 inches ...	18	0	0	18	0	0
5 Cwt. assorted octagon and oval best Steel for Chisels, at 60s... ..	15	0	0	15	0	0
6 Pairs of best patent Vices, with solid box and spiral washers, average 90lbs. each ...	13	10	0	13	10	0
4 Dozen best steel Hand Hammers... ..	7	0	0	7	0	0
4 Ratchet Braces, 14 and 24 inches ...				15	0	0
8 Anvils, $2\frac{1}{2}$ cwt. each, at £1-0 5-0-0 each ...				34	0	0
2 Do. 4 cwt ...				13	12	0
12 Sets of Smiths' Tools, Sledge and Stripping Hammers, Tongs, Sets Swages, &c., assorted, 2 cwt. to each set, at 56s. per cwt. Assortment of Files, two sets, each set to contain ...				67	4	0
3 Dozen 12-14 and 16 Hand Bastard ...	13	7	0			
3 Do. 12-14 and 16 do. second cut ...	15	15	0			
3 Do. 12-14 and 16 do. smooth ...	17	8	0			
1 Do. 12-14 and 16 do. round bastard ...	4	2	0			
1 Do. 12-14 and 16 do. second cut ...	4	15	0			
1 Do. 12-14 and 16 do. smooth ...	5	6	6			
1 Do. 10-12 and 14 Round bastard ...	2	17	0			
1 Do. 10-12 and 14 do. second cut ...	3	6	6			
1 Do. 10-12 and 14 Square bastard ...	2	11	3			
1 Do. 10-12 and 14 do. second cut. ...	3	1	9			
2 Do. 12- by $\frac{1}{2}$ Gulleting second cut ...	2	12	0			
2 Do. 9- by $\frac{3}{8}$ do. do. ...	1	9	0			
2 Do. 6 inches 3 square taper Saw Files ...	0	13	0			
2 Do. 4 inches do. do. do. ...	0	7	6			

25 per cent. Discount.....

Per set....

Two sets ...	58	3	8			
10 Sets of Carpenters' Tools. Each to contain 3 Planes, Hand, Tennoning, and Bow Saw, Best Brace and 36 bits, set of 6 Chisels and 6 Gongs, 6 Prickers, 4 Gimblets, 2 Turnscrews, 2 Gongs, 2 Squares, 2 Hammers, 2 Pincers, 1 pair Compasses, rule joint, 1 Bevel, 1 Blocker, 1 Hone in case, 1 Bass, 8 Augers $\frac{3}{8}$ to $1\frac{1}{2}$ inch, 1 Spokeshave, 3 Taper Files, 1 Wood Rasp, 1 Axe, 1 Adze, price per set ...	5	0	0	116	7	4
Ten sets.....				50	0	0
One hundred feet of $2\frac{1}{2}$ inch Belting, weight 50 lbs. at 2s. 6d. ...				12	10	0
Twenty-eight lbs. of Leather Laces for belting ...				1	17	4
All the above articles to be ordered from Messrs. Joshua Buckton and Co., Wellhouse Foundry, Leeds.						

70 Sets of Railway Waggon Wheels and Axles, with bearings for 5 ton Waggons, at 10£ per set ...	700	0	0			
4 Double powered Crab Winches, to lift 5 tons, at £16-10 each. ...	66	0	0			
NOTE.—The above to be ordered from Messrs. R. and W. Hawthorn, New Castle-on-Tyne. The Waggons fittings to be the same as those already supplied.						

4 Mortar Mills complete, with Steam Engines, the Engine to disconnect when required for other work, at 176£ each ...	£	s.	d.	£	s.	d.
NOTE.—These to be procured from Messrs. Garrett and Sons, Leiston Works, Saxmundham Suffolk.	704	0	0			

1 Five Horse-power portable Steam Engine from Messrs. Clayton Shuttleworth and Co., Lincoln, with the same extras as those supplied with the Engines already ordered... ..	200	0	0			
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15 Iron work for 15 fixed 3 ton jib cranes, same as specified in previous order, at 21£ ...	315	0	0			
15 Do. for 15 fixed, 5 ton jib cranes, at £24... ..	360	0	0			
10 Do. for 10 travelling 5 ton cranes, at £54 ...	540	0	0			
400 Wheelbarrow wheels, with axles, at 2s. 6d. each ...	50	0	0			
200 Crowbars, weight 32 lbs. steeled at both ends, one end pointed, the other clawed at 10s. 6d. each. ...	105	0	0			
1,000 Light Crowbars, weight 16 lbs. steeled at both ends, one end pointed, the other flat chisel shaped, at 5s. 4d. each. ...	266	13	4			
40 Dozen Railway Spades, broad treads, same as those specified in previous order, at 31s. ...	62	0	0			
200 Pick Axes, weight $9\frac{1}{2}$ lbs. each, steeled both ends ...	30	0	0			
NOTE.—The above to be ordered from the Kirkstall Forge, Iron Company, Leeds.						
100 Colonial Felling Axes, $6\frac{1}{2}$ lbs. weight each, at $7\frac{1}{2}$ d. per lb. ...	20	6	3			
100 Handles for do. ...	5	0	0			
12 Pit Saws, cast steel, $6\frac{1}{2}$ feet long, at 32s... ..	19	4	0			
12 Cross cut Saws, cast steel, 5 feet long, at 18s. ...	10	16	0			
12 Felloe Saws, cast steel, 5 feet long, at 10s... ..	6	0	0			
10 Mill Saws, cast steel, FOR CUTTING HARD WOOD, $4\frac{1}{2}$ feet long, 6 feet long. ...	13	0	0			
10 Do. do. ...	16	0	0			
4 Dozen Mill Saw Files ...	2	0	0			
8 Bottle Screw Jacks, to lift 4 tons each, at 52s. ...	20	16	0			
20 Stone Picks, steel pointed, at 4s. each, without handles ...	40	0	0			
8 Dozen Australian Miners' Picks, without handles, 3 lbs. weight, at 29s. per dozen ...	11	12	0			
1 Dozen patent Scythes, 30 inches ...	2	0	0			
6 Dozen common Sickles, 20 inches, at 8s. 3d. ...	2	9	6			
20 Sets of Caulking Irons, at 3s. 3d. per set ...	3	5	0			
1 Dozen Plated Spirit Levels, 10 inches... ..	2	8	0			
150 Hammers, Contractors, for boring drills, weight 5 lbs. each, at 1s. per lb....	37	10	0			
150 Do. do. 10 lbs. each, at 6d. per lb. ...	37	10	0			
The above to be ordered from Mr. G. H. Buck, Manufacturer, 122, Edgware road, London.						

4 Iron Pulley Blocks, with 1 sheaves 8" diameter ...	12	0	0			
4 Do. do. 2 sheaves 8" diameter ...	19	0	0			
4 Do. do. 3 sheaves 8" diameter ...	10	0	0			
2 Do. do. 4 sheaves 8" diameter ...	12	0	0			
5 Tons best $\frac{7}{8}$ inch Chain, at 21£ ...	105	0	0			
5 Do. do. at £21-10 ...	107	10	0			
5 Do. do. at £24 ...	120	0	0			
5 Do. do. at £26 ...	130	0	0			

NOTE.—The above to be ordered from Moser and Sons, 165, High Street, Southwork, London.

BAR IRON.

Round Bar.	Square Bar.	Flat Bar.
3 tons... $1\frac{1}{4}$ "	1 ton ... 2"	2 tons... 4" by $\frac{5}{8}$ "
$1\frac{1}{2}$ " ... 1"	1 ,, ... $1\frac{3}{8}$ "	2 ,, ... 3" by $\frac{1}{2}$ "
$1\frac{1}{2}$ " ... $\frac{5}{8}$ "	2 tons... $1\frac{1}{4}$ "	2 ,, ... 3" by $\frac{5}{8}$ "
1 ,, ... $\frac{5}{8}$ "	2 ,, ... 1"	3 ,, ... 2" by $\frac{1}{2}$ "
		2 ,, ... $1\frac{1}{2}$ " by $\frac{3}{4}$ "
		2 ,, ... $1\frac{3}{4}$ " by $\frac{1}{2}$ "

Total 26 tons at 8£ per ton.....

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for the month of May 1860.*

Five Steam Engines, of 12 Indicator Horse-power as described in accompanying Specification, at £200 each.	£ s. d.	£ s. d.
		1,000 0 0
Packing charges 5 per cent, on 4,525£		226 5 0
Freight on 180 tons, at 3£ per ton		510 0 0
Total estimated cost delivered in India.....		7,112 5 9

(Signed) F. T. HAIG, Captain,
District Engineer, Upper Godavery.

Dowlaiswaram, 7th March 1860.

From Captain F. T. HAIG, District Engineer, Upper Godavery, to Major W. H. HORSLEY,
Deputy Chief Engineer, Northern Circle, dated Camp at Dowlaiswaram, 13th March
1860, No. 33.

In forwarding the accompanying Specification and Sketch of the Engines, five of which are
entered in the list of Plant submitted with my letter of 7th instant, No. 25. I beg to suggest
that one or two of the Engines should be ordered from Messrs. Peacock and Ryers, Gorton
Works, Gorton, near Manchester, who are recommended by Mr. Moncrieff, the Superintendent
of the Dowlaiswaram Workshop.

*Specification of a pair of Engines and Boiler intended for the Upper Godavery Navigation Works.
Five such are required.*

1. The Engines to be high pressure, none condensing.
2. The Boiler vertical, tubular. Ordinary working pressure of steam, 100 lbs.
3. The Engines to be of 6 Indicator Horse-power each. The Boiler with its two attached
Engines, thus affording 12 Indicator Horse-power.
4. The Boiler and two Cylinders to be attached to the same bed plate, the Boiler standing
in the middle with a Cylinder on each side.
5. No part of the Engines or of their bearings is to be connected with or attached to the
Boiler.
6. The standard on which each Cylinder rests, to be distinct from both it and the bed
plate, and bolted to both, so as to be removable at pleasure if it should be necessary to place the
Cylinders at a different angle or in any other position.
7. Two cranked paddle shafts, similar to that shown in accompanying Sketch to be sup-
plied with each pair of Engines. The Sketch shows a transverse section of the boats in which
the Engines are intended to work.
8. An additional bearing for the shafts is required at (A) see Sketch. It should rest on
a standard attached to the bed plate and not to the Boiler.
9. The Boilers are intended to burn wood fuel.
10. The accompanying Sketch and following dimensions of a similar pair of Engines and
Boiler in use is given as a general guide, though the makers are not limited to a very close
adherence to these, provided only that the power specified is developed by the Engines.
Two Cylinders 6" diameter 14" stroke. Boiler vertical, 3' 6" diameter, with 54 copper
tubes 1 1/2" diameter and 5 feet long.
Furnace 1' 7" high and 2' 6" diameter. This Boiler does not give steam enough, the
furnace is deficient in height for wood fuel.
11. The usual fittings, cocks, gauges, tubes, &c., to be supplied, with duplicates of the
parts of the machinery most liable to injury.
12. The expensive link motion to be used, and the Engines to be so constructed that they
can be started reversed, &c., from the deck which will be about 6 feet above the bottom of the
boat.

(Signed) F. T. HAIG, Captain,
District Engineer, Upper Godavery.

MEMORANDUM.

The District Engineer, Upper Godavery, has the honor to forward a Plan of the small
Steamers intended for the Upper Godavery included in his Supplemental Estimate of Plant,
required of the 7th instant, No. 25.

The Plan should have accompanied Captain Haig's letter, No. 33 of yesterday's date.

(Signed) F. T. HAIG, Captain,
District Engineer, Upper Godavery.

Dowlaiswaram, 14th March 1860.

*Proceedings of the Madras Government, Public Works Department,
for the month of May 1860.*

ORDER THEREON, 17th May 1860, No. 1,030.

No. 108.

Resolved that application be made accordingly to the Right Honorable the Secretary of
State.

(Signed) J. D. BOURDILLON,
Secretary to Government.

N^o. 11957

11 B
Custal Office of P. W.
Chapault
31 March 1860.

From
The Chief Engineer

To
The Secretary
to Government Dept.

Public

Sir,

I have the honor to forward herewith the

2. 11957
1 letter from Dist. Eng.
Upper Podavari dated
7 March 1860 - 25
with 5 enclosures
1 de from de date 13th
March 1860 33 with
1 enclosure
1 de from de date 14th de with
1 enclosure (Sketch)

letters marginally noted received from the District
Engineer Upper Podavari, submitting a Supplemental
Estimate of Plant required for the Upper Podavari
Navigation works, amounting to £ 7412. 5. 9, accompanied
by a Specification as well as a Sketch of the
Engine applied for.

2. It will be observed that, with the
permission of the Right Honorable the Secretary

of State for India, Captain Stairs before leaving England ordered for the above works Plant to the value of £2694.14.6 a portion of which is now on its way to Madras, and that he had apprized the Secretary of State of his intention, after returning to India, to submit a Supplemental Estimate shewing what other plant would be required for the works, after ascertaining what articles could be made up here; but on consulting Mr. Cotton, Chief Superintendent of the Dowleswaram workshop, the District Engineer is of opinion that almost all the Plant can be procured from England at a cheaper cost than here.

3 The present Estimate of the probable quantity of Plant required has been prepared on the understanding that operations at the two Barriers will be sanctioned for simultaneous prosecution.

4 The Estimate for the 2 lower Barriers

Barriers is as follows:-

At Sinterat	Rupies 845,000
At Enchamphilly	338,000

Deducting Rupies 39,400 from the total of the above two sums, for the outlay in the purchase of Plant, which is reckoned at 1 lac for the whole of the works (estimated at 29 1/4 lacs) the balance available for the Sinterat and Enchamphilly Barriers will be as follows:

Sinterat	8,16,600
Enchamphilly	3,26,700

5. The work at each Barrier, it is expected, will occupy two years; those at Sinterat possibly more, Captain Stairs therefore, considers that if 5 3/4 lacs can be appropriated to the above projects annually for 2 years, 300 miles of the river may be opened for traffic in the 3rd year, should operations be commenced at both points at the same time. He adds, that if the 5 3/4 lacs above referred to be concentrated on one Barrier at a time, the improbability

of completing the work in one working season renders it expedient to avoid the risk entailed by the fresher passing over the masonry work in the river bed in its nearly finished, or newly completed state.

6. Captain Haig anticipates that he will be able to secure the services of proper Bricklayers and Masons from Nagpur and Hyderabad, and that a deficiency in the required complement of such workmen will probably be only felt the first year of the operations, as a good number could be trained for the work in a short space of time.

response.

4. In Paras 12 to 14 the District Engineer describes the purposes for which the several articles applied for are required, and the Manufacturers from whom he recommends that the articles should be procured. In conclusion, he observes that if ordered immediately, the greater part of the plant may be expected in time for the next working season, and that it is necessary that

the several Manufacturers should be instructed to despatch at once each article as soon as ready without waiting until they have completed their several orders.

8. — As from Para 3 of the letter of the Madras Government to the Government of India, it appears to be the intention of Government to recommend the prosecution of the Upper Godavari Works, and to obtain a special grant for the purpose, the limitations on expenditure having rendered it impracticable to provide adequately for them in the Budget of 1860/61, I consider it important that steps should be taken to procure from England the additional Plant applied for

by

by the District Engineer in time for
the next working season. —

Central Office P. M.
Chepauk
31 March 1860.

L. J. P. M. M.
W. J. Ch. Eng. & M. M. C. M.

I have the honor to be,

Sir,
Your most obedient servant

M. S. Bell Colonel
Chief Engineer

Dr. Geo: 1st Decr 75 by 12-11-11
this is a letter
to the Council of May
29th 1860.

From Chief Eng
23rd June 1860
No 1452.
From 5th 30 Oct 1860
No 2626

Dr. Geo: 1860
to the Council of May
29th 1860
No 1452

From Chief Eng
23rd June 1860
No 1452
to the Council of May
29th 1860

Letter of 21st
to the Council of May
29th 1860

No 1452
to the Council of May
29th 1860

to the Council of May
29th 1860
No 1452
to the Council of May
29th 1860

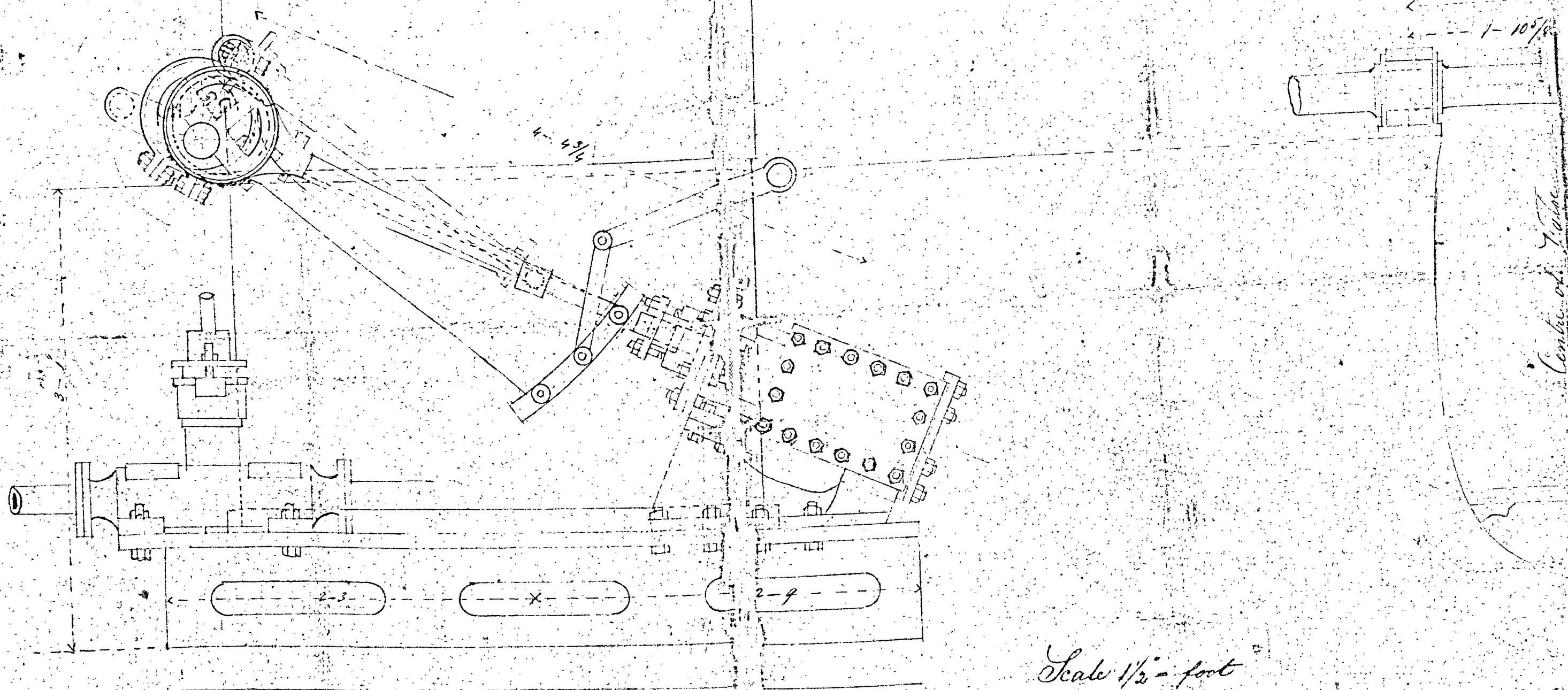
No 1030.

Resolved that at
the station be made near
the city to the right of the
while the clearing of the

From Chief Eng
23rd June 1860
No 1452
to the Council of May
29th 1860

to the Council of May
29th 1860
No 1452
to the Council of May
29th 1860

Rough Sketch
 of
 Engines and Boilers
 intended for
 Small Steamers
 Upper Godavari Navigation Works.



Scale $\frac{1}{2}$ - foot



Engines for No. 4 Steamer

J. H. C. Capt.
District Engineer

Wm. C. Little to Dr. J. C. Little
19 May 1899.

Dr 12/11/9