

Marine (1896) Department.

G.O., No. 489 Marine

DATED

7-7-96

[Despatch Abstract.]

Indian Directory. Pres. Financial
Dept^a requesting Messrs. Mack, Spink
and Co. to supply the Presidency Port
Officer, Madras, annually, with a copy
of their — commencing with the
issue for 1896, Count^d to that officer.

No. 489 Marine 7th July 1876
Communicated
to the Presidency Local
Officer.

7/7/96



PROCEEDINGS OF THE MADRAS GOVERNMENT.

Read the following paper:—

Proceedings of the Public Works Department (Marine)
dated 12th June 1896, No.420.(Marine).

-----X X X X X-----

O R D E R:—R.No.700, dated 25th June 1896.

Messrs Thacker Spink & Co will be requested to
supply the Presidency Port Officer, Madras, annually with a
copy of their Indian Directory commencing with the issue for
1896.

2. The necessary addition will be made to the appendix
to G.O. No.689.Financial, dated 12th September 1895.

(True Extract)

W. S. Sullivan

for Chief Secretary.

TO
The Accountant-General, Madras.

“ Marine Department. with Proceedings in original. ✓

Messrs Thacker Spink & Co., Calcutta.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following papers:—

From Major W. L. C. BADDELEY, R.E., Superintending Engineer, II Circle, to the Chief Engineer for Irrigation, dated Bezwada, 13th October 1894, No. 1588 K.S.

I have the honour to bring to your notice the risk of the Kistna works being dependent on a single steam launch.

2. The *Alexandra* was obtained in 1886 from the Government Dockyard, Kidderpore, and her dimensions are—

Length	 61'	Draught loaded	 3' 9"
Breadth (maximum)	 9' 2"	H.P.	 10
Depth	 5' 9"	Speed (maximum)	... 7 miles per hour.

The cost ... Rs. 14,139, including Rs. 1,727 for fitting her with cabins at Bezwada.

At the present rate of exchange, I suppose a similar launch would cost Rs. 18,000.

3. The launch has done her work well, but of late years she has broken down occasionally in the canals, and if this happened when she was crossing the river with any considerable current running, the consequences would be serious, as even if her anchors held, there would be no means of bringing her back into the canals until the river subsided.

4. As matters stand, it is impossible to make rapid inspections as there is no steam launch available. I hope, therefore, you will approve of the Kidderpore Dockyard being asked for plans and estimates for a steam launch, similar to the *Alexandra* but with slightly more beam and more powerful engines.

5. I cannot find in my office any drawings of the *Alexandra* and I conclude that they must be in your office.

To the Superintending Engineer, II Circle, dated 13th November 1894, No. 174 K.S.
From the " " " 24th November 1894, No. 1992 K.S.
To the " " " 5th December 1894, No. 189 K.S.
From the " " " 27th February 1895, No. 2681 K.S.

Memorandum to the Superintending Engineer, II Circle, dated 27th May 1895, No. II/87 K.S.

The question of the kind of steamer suitable for the Kistna has been under consideration of the Secretary to Government, Public Works Department, and Honourable Mr. Bliss, as well as the undersigned, and the following conclusions may be said to have been arrived at:—

(1) That it is impossible to design a steamer with a draught of only 2 feet that will be satisfactory in towing heavy boats across the Kistna.

(2) That as this is the service for which the steamer is mostly required, her adaptation for inspection work on the canals must be a secondary consideration.

(3) That to enable her to grip the water the steamer must draw at least 3 feet and would be better drawing $3\frac{1}{2}$ feet, and that there is no advantage to be gained by using stern wheels.

(4) No experience has yet been had of oil-engines, and it is considered that the best type of engine will be a simple non-condensing engine driving twin screws.

(5) With a beam of 14 feet and draught 3' 6", a powerful tug capable of drawing four heavy punts across the river against any flood should be possible, or eight punts when the river is low.

(6) The disadvantages of a flat-bottomed boat are a want of stability and of navigability, and these are considered to be of more importance than the power of getting easily off a shoal, besides which it is doubtful if a small keel would have much effect in the latter event.

2. The Superintending Engineer is requested to report the depth of water available in the Kistna and whether a channel 4 feet deep could not be easily maintained at slight cost across the shallow part.

(Signed) R. R. E. DRAKE-BROCKMAN, Col., R.E.,
Chief Engineer for Irrigation.

From the Executive Engineer, Kistna Northern Division, to the Superintending Engineer, II Circle, dated 21st June 1895, No. 183 S.E.

With reference to your endorsement No. 563 K.S., dated 5th June 1895, on the Chief Engineer's memo. No. II/87 K.S., I have the honour to report that I consider that an artificially-maintained channel in the Kistna river for navigation during low freshes would be very costly, but that for towing in the river the draft of the steamer could, without detriment, be increased to 3 feet as the boats she will have to tow will draw this.

2. I am, however, still strongly of opinion that the type of boat described in my letter No. 537 S.E., dated 12th February 1895, would be the most suitable for the work required of a steamer for the Kistna, as regards both her river or canal work.

In support of this view I would respectfully urge that the river steamers of all great companies, where not liable to be subjected to rough seas, are of the flat-bottomed paddle or stern wheel type, and that all river tugs are paddle boats. The shallow draft stern wheel steamers which are used in the Chindwin are, I believe, extensively used for towing. I would suggest a reference to the Director of Indian Marine, who could give reliable information on this head.

A stern wheel steamer is at present in daily use by the East Coast Railway for towing on the Gódávri between Rajahmundry and Gódávri South.

The engines of a stern wheeler are of the simplest possible type and every part of the propelling machinery is easily accessible.

No. 757 K.S.

Forwarded to the Chief Engineer for Irrigation, with reference to his memo. No. II/87 K.S., dated 27th May 1895.

2. The Superintending Engineer entirely agrees with Captain Ellis, R.E., in considering a flat-bottomed stern wheel steamer the most suitable type for the Kistna work. One great advantage of a stern wheel is that the machinery and wheel can be repaired without docking.

3. A channel, 4 feet deep, could certainly not be maintained at slight cost across the river when it is low, and the steamer should be quite independent of any artificial channel. It would, in the opinion of the Superintending Engineer, be most advisable to obtain the advice of the Director of Indian Marine before proceeding further in the matter.

29th June 1895.

(Signed) W. L. C. BADDELEY, Major, R.E.,
Superintending Engineer, II Circle.

To the Superintending Engineer, II Circle, dated 10th July 1895, No. 167 K.S.

From Major W. L. C. BADDELEY, R.E., Superintending Engineer, II Circle, to the Chief Engineer for Irrigation, dated 21st March 1896, No. 2701 K.S.

With reference to memo. No. II/107 K.S., dated 10th July 1895, I have the honour to forward herewith drawings, specification and letter from the Director of the Royal Indian Marine on the subject of the steamers required for the Kistna, and to request that the sanction of Government may be obtained to the provision of the steamers at the estimated cost.

2. The Superintending Engineer approves of the modifications suggested by the Director, but considers the provision of one of Sir William Thompson's patent sounding machines unnecessary.

ENCLOSURES.

From the Officiating Director of the Royal Indian Marine, Bombay, to the Superintending Engineer, II Circle, Bezwada, dated 12th March 1896, No. 1035 (Ships—Construction).

With reference to your letter No. 2012, dated 16th December 1895, I beg to forward herewith two sketches of the stern wheelers required—one to ply above the anicut, and the other below. The sketches have been prepared in accordance with the previous correspondence on this question, and embody the latest ideas as conveyed in your letter under reference.

2. No. I stern wheeler to ply below the anicut. The estimated cost including freight to and re-erection at destination is, if built as per sketch, Rs. 29,500. It is however considered a very unsatisfactory arrangement to have the awning as therein shown; it is absolutely necessary, in my opinion, that the awning should extend fore and aft to protect the engines and boilers, as well as the men working at them. If this be done, the cost will be increased to Rs. 30,000.

3. No. II stern wheeler to ply above the anicut. The cost of this steamer, if built as per sketch, is Rs. 29,000; the previous remarks about the awning also apply to this case, in which the cost would be increased to Rs. 29,500.

4. The whole of the awnings will be made portable, so that they can be taken off if the necessity arises.

5. With respect to the use of delta metal, I would observe that this metal is really only in its experimental stage so far as plates for the construction of vessels are concerned, although it has given most satisfactory results as a material for propellers, but by reason of its being allied to the aluminium alloys, the recent experience of the British Admiralty in the use of the latter for metal for torpedo tubes, and that of the French Admiralty in a torpedo boat recently built for them by Messrs. Yarrow and Co. has not been satisfactory; the adoption therefore of delta metal is not recommended in the construction of the two steamers under consideration, but as the British Admiralty build all torpedo boats of galvanized steel, and Messrs. Yarrow and Co. recommend the same procedure with light shallow draught steamers, the defects complained of in the *Alexandra* would in all probability be avoided in the new steamers were their floor plates and bottom plates of galvanized steel.

6. As regards a removable gear for taking soundings, it would probably be better to obtain that of Sir William Thompson's patent sounding machines, but of a size smaller than usually fitted in a seagoing vessel. The cost of this machine is not included in the estimate.

7. An outline specification is also attached.

Outline specification of two stern wheel launches to work on Kistna above and below anicut.

	FT.
Length between perpendicular	75
Beam, extreme	14
Depth	4

Hull—to be subdivided by five transverse W.I. bulkheads forming six water-tight compartments.

Plating—to be $\frac{1}{8}$ " galvanized (if so ordered) steel plates, with butts properly shifted, lap jointed and butted.

Frames—to be of steel angles $1\frac{3}{4}" \times \frac{1}{2}" \times \frac{3}{16}"$ spaced 2 feet apart.

Floors—to be of $\frac{3}{32}"$ galvanized (if so ordered) steel plating.

Reverse bars—to be of steel angles $1\frac{1}{4}" \times 1\frac{1}{4}" \times \frac{3}{16}"$ turned up at the bilges sufficiently to make a strong connection with frames.

Deck beams—to be of steel angles $2" \times 1\frac{1}{2}" \times \frac{3}{16}"$ connected to frames by steel gusset plates $9" \times 9" \times \frac{3}{16}"$.

Bulkheads transverse—to be of steel plate $\frac{3}{32}"$ thick stiffened by angle bars $1\frac{1}{2}" \times 1\frac{1}{2}" \times \frac{3}{16}"$. Boundary angles to be $1\frac{3}{4}" \times 1\frac{3}{4}" \times \frac{1}{4}"$.

No. 504 I., 12TH JUNE 1896.

Bulkheads longitudinal—to be of steel plates $\frac{1}{8}$ " thick, one on each side, to extend right fore and aft where broken, to make cool bunker bulkheads; continuity of strength to be maintained by overlapping. Bulkhead to be stiffened by angles $1\frac{1}{2}" \times 1\frac{1}{2}" \times \frac{1}{4}"$ as shown in sketch. Top and bottom boundary angles to be of steel $1\frac{1}{2}" \times 1\frac{1}{2}" \times \frac{1}{4}"$.
 Stringer—to be a steel plate $\frac{1}{8}$ " thick 12" wide with gunwale angle $1\frac{1}{2}" \times 1\frac{1}{2}" \times \frac{1}{4}"$.
 Engine and boiler bearers—to be as per sketch.
 Screen bulkhead—to be of $\frac{1}{8}$ " plating, properly stiffened and shaped as per sketch.
 Deck—to be of teak $1\frac{1}{2}"$ thick, properly fastened.
 Cabin—As per sketches, which is arranged so as to allow for minimum height specified and in accordance with letters from Public Works Department, Madras, Nos. 1972 and 2012 K.S., dated 10th and 16th December 1895, respectively.
 Deck fittings—to be as usual for launches of this description and as shown on sketches.
 Equipment—to be fitted out complete with necessary anchors, cables, awnings, curtains, &c., as usual and necessary for launches of this size.
 Boilers—to be of Loco. type suitable to a working pressure of 150 lb. per square inch.
 Engines—Cylinders 2 in number, $11\frac{1}{2}"$ diameter, 42" stroke to develop, about 160 Horsepower.
 General—Launches to be as per sketches generally, stiffened as shown thereon.

2nd March 1896.

(Signed) T. AVERY,
Constructor.

To the Superintending Engineer, II Circle, dated 1st April 1896, No. 49 K.S.

From Major W. L. C. BADDELEY, R.E., Superintending Engineer, II Circle,
to the Chief Engineer for Irrigation, dated Bezwada, 13th April 1896,
No. 120 K.N.

In reference to your No. II/49 K.S., dated 1st April 1896, I have the honour to inform you that the Director, Royal Indian Marine, has not expressed any positive opinion as to the relative advantages of twin screws and stern wheelers, but in one of his letters to me he remarks—

I am of opinion the steamer to ply on the river below the anicut should be a turn-screw launch, provided the minimum depth of water is not less than three feet.

2. As however, for work below the anicut, we require a steamer with draught not exceeding 2 feet, the proposal to provide a turn-screw launch was not accepted.

3. When Mr. Taylor, an Engineer of the Royal Indian Marine and one of the staff of the Kidderpore Dockyard, was at Bezwada, he was consulted by Captain Ellis, R.E., and expressed an opinion that both for river and canal work a stern wheeler was the most suitable. Mr. Taylor, I understand, has had much experience of these boats in Burma.

4. I will make a further reference to the Director of the Royal Indian Marine, and let you know the result.

From the Director of the Royal Indian Marine, Bombay, to the Superintending Engineer, II Circle, Bezwada, dated 17th April 1896, No. 1613 (Ships—Construction).

With reference to your letter No. 121 K.N. of 13th instant, I beg to say the general question as to whether twin screw or stern wheel steamers are the most suitable type for use on the Kistna river above and below the anicut, depends entirely on the depth of water that exists. If there is sufficient water at all times, say about 6 feet for a steamer drawing not less than 3 feet, then I would recommend a twin screw steamer as being handier and having more speed; but if a draught of not more than 2 feet is allowable, then the stern wheel type is the kind that must be used.

2. Another point which militates against screw-propulsion for shallow rivers is the risk of the propeller striking the bottom and getting damaged, or bending the shaft, which involves the vessel being placed in dock for repair, while in the case of a stern wheeler everything is above the water and accessible; but of course, if draught is no object, much better results, as regards speed, would be obtained with the screw steamer.

No. 504 I., 12TH JUNE 1896.

No. 201 K.S.

Forwarded to the Chief Engineer for Irrigation in continuation of No. 120 K.N., dated 13th April 1896.

25th April 1896.

(Signed) W. L. C. BADDELEY, Major, R.E.,
Supg. Engineer, II Circle.

No. 112 I.

Submitted to Government with a recommendation that, as a depth of 6 feet cannot be depended on at all times, sanction may be accorded to the provision of two stern wheel steamers at an estimated cost of Rs. 59,500.

27th May 1896.

(Signed) R. R. E. DRAKE-BROCKMAN, Col., R.E.,
Chief Engineer for Irrigation.

ORDER—No. 504 I., dated 12th June 1896.

The Government of India in the Marine Department will be requested to order the construction at the Government Dockyard at Bombay of the two stern wheel steamers required for the Kistna delta.

2. The following estimates are sanctioned from the balance of the amount reserved for tools and plant required for the Kistna delta system, which will then be reduced to Rs. 45,034 :—

Capital expenditure not charged to Revenue.

49. Irrigation.
Kistna Delta System.
Eastern Section.
III. Tools and Plant.
4. Navigation Plant.

	RS.
(1) Constructing No. I stern wheel steamer to ply below the Kistna anicut	30,000
(2) Constructing No. II stern wheel steamer to ply above the Kistna anicut	29,500
Total	59,500

3. This sanction is registered as No. 60 I. of 1896-97.

4. Ordered that the following letter be sent.

[Here enter No. 505 I., dated 12th June 1896.]

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Colonel, R.E.,
Secretary to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, II Circle.
" Examiner, Public Works Accounts.
" Revenue Department.
" Marine Department.

Ed. T. K. Narayana Aiyangar.
Spare Copies

IRRIGATION.

Gobt. of {1896} Madras.
PUBLIC WORKS.

No 490. Mar. 4 & July 96.

Recorded.

sg. J. Sme N.C

W
Marine

Dated June, 12th.

Recd.

Encl.

G.O. No. 504 I., 12th June 1896.

JUNE.

Stern Wheel Steamers

The estimates amounting to Rs. 59,500 for constructing two — to ply above and below the Kistna anicut, Kistna Eastern delta, sanctioned, and the Government of India ordered to be addressed to arrange for their construction at the Government Dockyard, Bombay.

The P.P.O.

No. 504 I., 12TH JUNE 1896.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following papers:—

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I have the honour to bring to your notice the risk of the Kistna works being dependent on a single steam launch.

2. The *Alexandra* was obtained in 1886 from the Government Dockyard, Kidderpore, and her dimensions are—

Length	... 61'	Draught loaded	... 3' 9"
Breadth (maximum)	... 9' 2"	H.P.	... 10
Depth	... 5' 9"	Speed (maximum)	... 7 miles per hour.

The cost ... Rs. 14,139, including Rs. 1,727 for fitting her with cabins at Bezwada.

At the present rate of exchange, I suppose a similar launch would cost Rs. 18,000.

3. The launch has done her work well, but of late years she has broken down occasionally in the canals, and if this happened when she was crossing the river with any considerable current running, the consequences would be serious, as even if her anchors held, there would be no means of bringing her back into the canals until the river subsided.

4. As matters stand, it is impossible to make rapid inspections as there is no steam launch available. I hope, therefore, you will approve of the Kidderpore Dockyard being asked for plans and estimates for a steam launch, similar to the *Alexandra* but with slightly more beam and more powerful engines.

5. I cannot find in my office any drawings of the *Alexandra* and I conclude that they must be in your office.

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- (1) That it is impossible to design a steamer with a draught of only 2 feet that will be satisfactory in towing heavy boats across the Kistna.
- (2) That as this is the service for which the steamer is mostly required, her adaptation for inspection work on the canals must be a secondary consideration.
- (3) That to enable her to grip the water the steamer must draw at least 3 feet and would be better drawing 3½ feet, and that there is no advantage to be gained by using stern wheels.

(4) No experience has yet been had of oil-engines, and it is considered that the best type of engine will be a simple non-condensing engine driving twin screws.

(5) With a beam of 14 feet and draught 3' 6", a powerful tug capable of drawing four heavy punts across the river against any flood should be possible, or eight punts when the river is low.

(6) The disadvantages of a flat-bottomed boat are a want of stability and of navigability, and these are considered to be of more importance than the power of getting easily off a shoal, besides which it is doubtful if a small keel would have much effect in the latter event.

2. The Superintending Engineer is requested to report the depth of water available in the Kistna and whether a channel 4 feet deep could not be easily maintained at slight cost across the shallow part.

(Signed) R. R. E. DRAKE-BROCKMAN, Col., R.E.,
Chief Engineer for Irrigation.

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2. I am, however, still strongly of opinion that the type of boat described in my letter No. 537 S.E., dated 12th February 1895, would be the most suitable for the work required of a steamer for the Kistna, as regards both her river or canal work.

In support of this view I would respectfully urge that the river steamers of all great companies, where not liable to be subjected to rough seas, are of the flat-bottomed paddle or stern wheel type, and that all river tugs are paddle boats. The shallow draft stern wheel steamers which are used in the Chindwin are, I believe, extensively used for towing. I would suggest a reference to the Director of Indian Marine, who could give reliable information on this head.

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3. A channel, 4 feet deep, could certainly not be maintained at slight cost across the river when it is low, and the steamer should be quite independent of any artificial channel. It would, in the opinion of the Superintending Engineer, be most advisable to obtain the advice of the Director of Indian Marine before proceeding further in the matter.

29th June 1895.

(Signed) W. L. C. BADDELEY, Major, R.E.,
Superintending Engineer, II Circle.

To the Superintending Engineer, II Circle, dated 10th July 1895, No. 167 K.S.

From Major W. L. C. BADDELEY, R.E., Superintending Engineer, II Circle, to the Chief Engineer for Irrigation, dated 21st March 1896, No. 2701 K.S.

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2. The Superintending Engineer approves of the modifications suggested by the Director, but considers the provision of one of Sir William Thompson's patent sounding machines unnecessary.

ENCLOSURES.

From the Officiating Director of the Royal Indian Marine, Bombay, to the Superintending Engineer, II Circle, Bezwada, dated 12th March 1896, No. 1035 (Ships—Construction).

With reference to your letter No. 2012, dated 16th December 1895, I beg to forward herewith two sketches of the stern wheelers required—one to ply above the anicut, and the other below. The sketches have been prepared in accordance with the previous correspondence on this question, and embody the latest ideas as conveyed in your letter under reference.

2. No. I stern wheeler to ply below the anicut. The estimated cost including freight to and re-erection at destination is, if built as per sketch, Rs. 29,500. It is however considered a very unsatisfactory arrangement to have the awning as therein shown; it is absolutely necessary, in my opinion, that the awning should extend fore and aft to protect the engines and boilers, as well as the men working at them. If this be done, the cost will be increased to Rs. 30,000.

3. No. II stern wheeler to ply above the anicut. The cost of this steamer, if built as per sketch, is Rs. 29,000; the previous remarks about the awning also apply to this case, in which the cost would be increased to Rs. 29,500.

4. The whole of the awnings will be made portable, so that they can be taken off if the necessity arises.

5. With respect to the use of delta metal, I would observe that this metal is really only in its experimental stage so far as plates for the construction of vessels are concerned, although it has given most satisfactory results as a material for propellers, but by reason of its being allied to the aluminium alloys, the recent experience of the British Admiralty in the use of the latter metal for torpedo tubes, and that of the French Admiralty in a torpedo boat recently built for them by Messrs. Yarrow and Co. has not been satisfactory; the adoption therefore of delta metal is not recommended in the construction of the two steamers under consideration, but as the British Admiralty build all torpedo boats of galvanized steel, and Messrs. Yarrow and Co. recommend the same procedure with light shallow draught steamers, the defects complained of in the *Alexandra* would in all probability be avoided in the new steamers were their floor plates and bottom plates of galvanized steel.

6. As regards a removable gear for taking soundings, it would probably be better to obtain that of Sir William Thompson's patent sounding machines, but of a size smaller than usually fitted in a seagoing vessel. The cost of this machine is not included in the estimate.

7. An outline specification is also attached.

Outline specification of two stern wheel launches to work on Kistna above and below anicut.

	FT.
Length between perpendicular	75
Beam, extreme	14
Depth	4

Hull—to be subdivided by five transverse W.I. bulkheads forming six water-tight compartments.

Plating—to be $\frac{1}{8}$ " galvanized (if so ordered) steel plates, with butts properly shifted, lap jointed and buttet.

Frames—to be of steel angles $1\frac{3}{4}" \times \frac{1}{2}" \times \frac{3}{16}"$ spaced 2 feet apart.

Floors—to be of $\frac{3}{16}"$ galvanized (if so ordered) steel plating.

Reverse bars—to be of steel angles $1\frac{1}{4}" \times 1\frac{1}{4}" \times \frac{3}{16}"$ turned up at the bilges sufficiently to make a strong connection with frames.

Deck beams—to be of steel angles $2" \times 1\frac{1}{2}" \times \frac{3}{16}"$ connected to frames by steel gusset plates $9" \times 9" \times \frac{3}{16}"$.

Bulkheads transverse—to be of steel plate $\frac{3}{16}"$ thick stiffened by angle bars $1\frac{1}{2}" \times 1\frac{1}{2}" \times \frac{3}{16}"$.

Boundary angles to be $1\frac{3}{4}" \times 1\frac{3}{4}" \times \frac{1}{4}"$.

Bulkheads longitudinal—to be of steel plates $\frac{1}{8}$ " thick, one on each side, to extend right fore and aft where broken, to make cool bunker bulkheads; continuity of strength to be maintained by overlapping. Bulkhead to be stiffened by angles $1\frac{1}{2}$ " $\times$ $1\frac{1}{2}$ " $\times$ $\frac{3}{16}$ " as shown in sketch. Top and bottom boundary angles to be of steel $1\frac{3}{4}$ " $\times$ $1\frac{3}{4}$ " $\times$ $\frac{1}{4}$ ".

Stringer—to be a steel plate $\frac{1}{8}$ " thick 12" wide with gunwale angle $1\frac{1}{2}$ " $\times$ $1\frac{1}{2}$ " $\times$ $\frac{1}{4}$ ".
Engine and boiler bearers—to be as per sketch.
Screen bulkhead—to be of $\frac{1}{8}$ " plating, properly stiffened and shaped as per sketch.

Deck—to be of teak $1\frac{1}{2}$ " thick, properly fastened.
Cabin—As per sketches, which is arranged so as to allow for minimum height specified and in accordance with letters from Public Works Department, Madras, Nos. 1972 and 2012 K.S., dated 10th and 16th December 1895, respectively.

Deck fittings—to be as usual for launches of this description and as shown on sketches.
Equipment—to be fitted out complete with necessary anchors, cables, awnings, curtains, &c., as usual and necessary for launches of this size.

Boilers—to be of Loco. type suitable to a working pressure of 150 lb. per square inch.
Engines—Cylinders 2 in number, $11\frac{1}{2}$ " diameter, 42" stroke to develop, about 160 Horse-power.

General—Launches to be as per sketches generally, stiffened as shown thereon.

2nd March 1896.

(Signed) T. AVERY,
Constructor.

To the Superintending Engineer, II Circle, dated 1st April 1896, No. 49 K.S.

From Major W. L. C. BADDELEY, R.E., Superintending Engineer, II Circle, to the Chief Engineer for Irrigation, dated Bezwada, 13th April 1896, No. 120 K.N.

In reference to your No. II/49 K.S., dated 1st April 1896, I have the honour to inform you that the Director, Royal Indian Marine, has not expressed any positive opinion as to the relative advantages of twin screws and stern wheelers, but in one of his letters to me he remarks—

I am of opinion the steamer to ply on the river below the anicut should be a turn-screw launch, provided the minimum depth of water is not less than three feet.

2. As however, for work below the anicut, we require a steamer with draught not exceeding 2 feet, the proposal to provide a turn-screw launch was not accepted.

3. When Mr. Taylor, an Engineer of the Royal Indian Marine and one of the staff of the Kidderpore Dockyard, was at Bezwada, he was consulted by Captain Ellis, R.E., and expressed an opinion that both for river and canal work a stern wheeler was the most suitable. Mr. Taylor, I understand, has had much experience of these boats in Burma.

4. I will make a further reference to the Director of the Royal Indian Marine, and let you know the result.

From the Director of the Royal Indian Marine, Bombay, to the Superintending Engineer, II Circle, Bezwada, dated 17th April 1896, No. 1613 (Ships—Construction).

With reference to your letter No. 121 K.N. of 13th instant, I beg to say the general question as to whether twin screw or stern wheel steamers are the most suitable type for use on the Kistna river above and below the anicut, depends entirely on the depth of water that exists. If there is sufficient water at all times, say about 6 feet for a steamer drawing not less than 3 feet, then I would recommend a twin screw steamer as being handier and having more speed; but if a draught of not more than 2 feet is allowable, then the stern wheel type is the kind that must be used.

2. Another point which militates against screw-propulsion for shallow rivers is the risk of the propeller striking the bottom and getting damaged, or bending the shaft, which involves the vessel being placed in dock for repair, while in the case of a stern wheeler everything is above the water and accessible; but of course, if draught is no object, much better results, as regards speed, would be obtained with the screw steamer.

No. 201 K.S.

Forwarded to the Chief Engineer for Irrigation in continuation of No. 120 K.N., dated 13th April 1896.

25th April 1896.

(Signed) W. L. C. BADDELEY, Major, R.E.,
Supg. Engineer, II Circle.

No. 112 I.

Submitted to Government with a recommendation that, as a depth of 6 feet cannot be depended on at all times, sanction may be accorded to the provision of two stern wheel steamers at an estimated cost of Rs. 59,500.

27th May 1896.

(Signed) R. R. E. DRAKE-BROCKMAN, Col., R.E.,
Chief Engineer for Irrigation.

ORDER—No. 504 I., dated 12th June 1896.

The Government of India in the Marine Department will be requested to order the construction at the Government Dockyard at Bombay of the two stern wheel steamers required for the Kistna delta.

2. The following estimates are sanctioned from the balance of the amount reserved for tools and plant required for the Kistna delta system, which will then be reduced to Rs. 45,034 :—

Capital expenditure not charged to Revenue.

49. Irrigation.
Kistna Delta System.
Eastern Section.
III. Tools and Plant.
4. Navigation Plant.

	RS.
(1) Constructing No. I stern wheel steamer to ply below the Kistna anicut	30,000
(2) Constructing No. II stern wheel steamer to ply above the Kistna anicut	29,500
Total	59,500

3. This sanction is registered as No. 60 I. of 1896-97.

4. Ordered that the following letter be sent.

[Here enter No. 505 I., dated 12th June 1896.]

(True Extract.)

Under Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, II Circle.
" Examiner, Public Works Accounts.
" Revenue Department.
" Marine Department.

Exd. T. K. Narayana Aiyangar.
Spare Copies

IRRIGATION.

Gobt. of {1896} Madras.
PUBLIC WORKS.

738
Recd 47.56
+ Cw 1115/96.

Recd 4900 on 8th July 1896
Recorded.

Dated June, 12th.

Recd.

Encl.

G.O. No. 504 I., 12th June 1896.

JUNE.

Stern Wheel Steamers

The estimates amounting to Rs. 59,500 for constructing two — to ply above and below the Kistna anicut, Kistna Eastern delta, sanctioned, and the Government of India ordered to be addressed to arrange for their construction at the Government Dockyard, Bombay.

with order

1677 with

Accompaniment to G.O. No. 1805 W., dated 18th June 1896.

STATEMENT showing the allotments required for incomplete works of 1894-95 and for new works proposed to be undertaken under Excluded Local, Port Funds.

Division.	Item number.	Name of work.	Amount of estimate.	Number and date of sanction.	Past expenditure.	Balance of estimate.	Amount required.				Item number.
							For work.	For establishment.	For tools and plant.	Total.	
Ganjám.	1	Constructing quarters and latrine for the lighthouse superintendent and additional keepers at Calingapatam.	Rs. 6,120	G.O. No. 1701 W., dated 11th July 1895, and G.O. No. 1938 W., dated 3rd August 1895.	Rs. 2,746	Rs. 3,374	Rs. 3,374	Rs. 776	Rs. 51	Rs. 4,201	1
Kistna Eastern.	2	Clearing silt in the salt creek below tidal lock at Masulipatam.	2,300	Sanctioned by Superintending Engineer.	876	1,424	1,424	328	21	1,773	2
West Coast.	3	Constructing new rough stone groynes on the Vypeen fore shore.	3,600	G.O. No. 3092 W., dated 2nd December 1895.	..	3,600	3,600	828	54	4,482	3
	4	Constructing a sea wall in front of the Sea Customs office and flagstaff, Tellicherry.	4,580	G.O. No. 882 W., dated 11th March 1896.	..	4,580	4,580	1,053	69	5,702	4
	5	Collection of rough stone boulders as a reserve stock on the Vypeen foreshore.	5,000	G.O. No. 513 W., dated 11th February 1896.	..	5,000	5,000	1,150	75	6,225	5
	6	Collection of rough stone boulders as a reserve stock at Cochin.	2,620	Do. do.	..	2,620	2,620	603	39	3,262	6
	7	Repairs to groynes and revetments on the Vypeen foreshore.	2,180	Superintending Engineer's Register No. 17 of 1895-96.	1,610	570	570	131	9	710	7
Tinnevely.	8	Constructing a new pier at Tuticorin and the reclamation of the foreshore at Tuticorin near the Government pier.	1,86,000	G.O. No. 280 W., dated 23rd January 1896.	1,43,508	42,490	42,490	..	..	42,490	8
	9	Repairs to the lighthouse at Manapad.	310	Superintending Engineer's Register No. 4 of 1895-96.	..	310	310	71	5	386	9
Total ..			..		..	..	62,968	4,940	323	69,231	

No. 1805 W., 18TH JUNE 1896.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

General.
Account.

READ—the following papers :—

From the Superintending Engineer,	I Circle, dated 11th May 1896, No. 106 Gl.
"	II " " 22nd " " 96 Gl.
"	IV " " 21st " " 240 W.
"	VI " " 14th " " 757 T.C.

ORDER—No. 1805 W., dated 18th June 1896.

The papers recorded above contain applications from the Superintending Engineers, I, II, IV and VI Circles, for funds required under Excluded Local, Port Funds, for incomplete works of 1895-96, and for new works proposed to be undertaken in the current official year. The demands, details of which are given in the annexed statement, are as shown below :—

	RS.
Works	63,968
Establishment	4,940
Tools and plant	323
Total	69,231

2. The question of providing the amount required will be considered in the Financial Department.

3. In G.O. No. 1518 W., dated 14th May 1896, the Financial Department was asked to sanction an additional allotment of Rs. 10,000, or Rs. 12,450 inclusive of percentage charges, to form a reserve in the Public Works Department to meet unforeseen demands. The amount now applied for will therefore be a further addition to the grant under this head.

4. The statement submitted by the Superintending Engineer, VI Circle, does not show the amounts to be provided for the pier at Tuticorin, item 8 of the accompaniment, on account of establishment and tools and plant. The Superintending Engineer will furnish this information as early as possible, and on its receipt a separate application will, if necessary, be made to the Financial Department for the required amount.

(True Extract.)

(Signed) D. McNEIL CAMPBELL, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.

To Superintending Engineers, I, II, IV and VI Circles.
" the Examiner, Public Works Accounts.
" the Financial Department.
" the Marine Department.

Exd. T. K. Narayana Aiyangar.
Spare Copies

GENERAL.
ACCOUNT.

Gobt. of {1896} Madras.
PUBLIC WORKS.

N^o 491. Mar: of 8th July 1906.

Commnd: to the Presy.

Post officers.

sgy. J. M. N. C.

W

Marine

Dated June, 18th.

Recd.

Encl.

G.O. No. 1805 W., 18th June 1896.

JUNE.

Demands under Excluded
Local, Port Funds

Passing orders on the statements of —,
for incomplete works of 1895-96 and for
new works proposed to be undertaken in the
current official year.

The P.P.O.

Accompaniment to G.O. No. 1805 W., dated 18th June 1896.

STATEMENT showing the allotments required for incomplete works of 1894-95 and for new works
proposed to be undertaken under Excluded Local, Port Funds.

Division.	Item number.	Name of work.	Amount of estimate.	Number and date of sanction.	Past expenditure.	Balance of estimate.	Amount required.				Item number.
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	9	Repairs to the lighthouse at Manapaud.	310	Superintending Engineer's Register No. 4 of 1895-96.	..	310	310	71	5	386	9
Total ..			..	..	..	..	63,968	4,940	323	69,231	

No. 1805 W., 18TH JUNE 1896.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

General.
Account.

READ—the following papers:—

From the Superintending Engineer,	I Circle, dated 11th May 1896, No. 106 G1.
"	II " " 22nd " " 96 G1.
"	IV " " 21st " " 240 W.
"	VI " " 14th " " 757 T.C.

ORDER—No. 1805 W., dated 18th June 1896.

The papers recorded above contain applications from the Superintending Engineers, I, II, IV and VI Circles, for funds required under Excluded Local, Port Funds, for incomplete works of 1895-96, and for new works proposed to be undertaken in the current official year. The demands, details of which are given in the annexed statement, are as shown below:—

Works	...	...	...	...	...	...	...	...	RS.
Establishment	...	...	...	...	...	...	...	...	63,968
Tools and plant	...	...	...	...	...	...	...	...	4,940
									323
Total	...	...	...	...	...	...	...	...	69,231

2. The question of providing the amount required will be considered in the Financial Department.

3. In G.O. No. 1518 W., dated 14th May 1896, the Financial Department was asked to sanction an additional allotment of Rs. 10,000, or Rs. 12,450 inclusive of percentage charges, to form a reserve in the Public Works Department to meet unforeseen demands. The amount now applied for will therefore be a further addition to the grant under this head.

4. The statement submitted by the Superintending Engineer, VI Circle, does not show the amounts to be provided for the pier at Tuticorin, item 8 of the accompaniment, on account of establishment and tools and plant. The Superintending Engineer will furnish this information as early as possible, and on its receipt a separate application will, if necessary, be made to the Financial Department for the required amount.

(True Extract.)

C. R. B. B. B.
Under Secy. to Govt., P.W.D.

To Superintending Engineers, I, II, IV and VI Circles.
" the Examiner, Public Works Accounts.
" the Financial Department.
" the Marine Department. ✓

Exd. T. K. Narayana Aiyangar.
Spare Copies

*not Committed
Marine Dept*

Exd. 545/96

GENERAL.
ACCOUNT.

Govt. of {1896} Madras.
PUBLIC WORKS.

Dated June, 18th.

Recd.

Encl.

G.O. No. 1805 W., 18th June 1896.

JUNE.

**Demands under Excluded
Local, Port Funds**

Passing orders on the statements of —,
for incomplete works of 1895-96 and for
new works proposed to be undertaken in the
current official year.

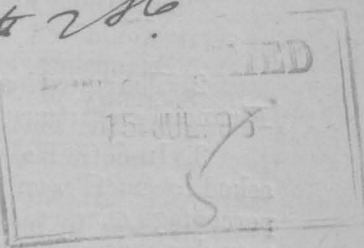
307 mat 9 5-5-96.
166 a 9 13-3-96.
111 a 9 22-2-96
131 a 9 10-5-95
56 a 9 18-2-95
244 a 9 15-3-93.

Re. 491 Marine 9 8 July 1896
Communicated
to the Presidency Port
officer.

8/7/96

The P.P.O. etc 286

S.F.



B. G. M.

Removed from 20
596 mat 9 2-9-96

16/7

16/7

No. 1847 W., 20TH JUNE 1896.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—again the following paper :—

G.O. No. 247, Marine, dated 9th April 1896.

Read—also the following papers :—

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

The Collector states that, in 1893, when it was decided to abandon temporarily the Ross Hill cutting at Vizagapatam and to give access to the port by a line skirting Ross Hill on the south-west, he objected to the proposal and only withdrew his opposition on the railway authorities undertaking to cross the backwater on a bridge of wooden piles. This promise he states has not been kept and reports that the railway authorities propose to block up the arm of the backwater altogether.

The history of the case appears to be as follows :—

Since the year 1858, numerous proposals have been put forward for improving the harbour at Vizagapatam. The Government of Madras came to the conclusion that it would not be possible for a reasonable sum of money to construct a harbour at Vizagapatam, but, on the construction of the East Coast Railway being sanctioned, the Secretary of State considered that the matter deserved further consideration, and in 1891 Mr. Thorowgood, an expert in these matters, was commissioned by the Secretary of State to make a further report.

It will be seen that a feature of Mr. Thorowgood's report (paragraphs 27 and 37) was to increase the tidal capacity of the estuary by removing the reclaimed land lying between high and low water. (See sketch.)

The Chief Engineer to Government of Madras, Public Works Department, in commenting on Mr. Thorowgood's report, considered that the proposal to increase the tidal capacity of the estuary was a good one pointing out the injury done to the port by the reclamation of land once covered by the tides.

In 1893 the Engineer-in-Chief, East Coast Railway (Mr. Spring), reported that the approach to the port through Ross Hill cutting (900 feet long and 98 feet deep in the deepest part) was becoming unsafe owing to the unstable character of the rock. It was not possible to flatten the slopes, because this would involve the destruction of a Mahomedan mosque on one side and a Roman Catholic church on the other. Under these circumstances he proposed a line (called hereafter the swamp line) skirting Ross Hill on the south-west and giving better access to the port than the old line through the cutting. He proposed one 40 feet opening for flood-water.

This letter was transferred to the Director-General of Railways who requested that the views of the Madras Government might be communicated. The papers were then transferred to the Revenue and Marine Departments, and a report was made by the Presidency Port Officer Captain Street. This was forwarded to the Government of India with a letter recommending that the Ross Hill cutting be abandoned and used for cart traffic and that the swamp line should be adopted.

This letter was despatched on the 18th October 1893 and on the 20th a reference from the Revenue Department was received containing a letter from the Collector Mr. W. A. Willock stating that the proposals for an approach to the port were being recast by Mr. J. R. Bell, the Engineer-in-Chief, and that the plan (Mr. Spring's) forwarded to him for report was now abandoned and asking that he might be allowed to defer his report till Mr. Bell had matured his new proposal. He adds that, in the improbable event of Mr. Spring's views being taken up, he would at once report on the subject. This letter was not forwarded to the Government of India, as it contained no information on the point at issue.

The Government of India, on receiving Commander Street's report and the recommendations of the Madras Government, remarked that the proposed line (the swamp line) would cut across the reclaimed land which Mr. Thorowgood proposed to cut away (*vide* paragraph 37 of his report above alluded to) and suggested that the Chief Engineer, Public Works Department, Madras, should express his views as to how far the proposed line affected Mr. Thorowgood's scheme.

The Chief Engineer reported that there was no objection to the line provided that a total waterway of not less than 300 feet was provided.

This letter was communicated to the Government of India who replied in January 1894 to the effect that the swamp line was approved provided that a total waterway of not less than 200 feet was given in the bank to the west of Ross Hill.

In March 1894 the Manager, East Coast Railway (Mr. Brereton), reported that he had inspected the alignment with Commander Street and that the conclusion arrived at was that the embankment ought to be continuous at the crossing of the backwater, the reason being that the water issuing from this opening at ebb tides strikes the main ebb at right angles and causes an eddy which has the effect of scouring a deep hole near the Pontoon bridge and throwing up a sand bank just beyond in the middle of the stream. He proposed therefore to close this opening and give another opening of 3 spans of 40 feet higher up.

The Manager was informed that the waterway to be given depended on the amount of water to be discharged between tides, and, as there was no diminution of the collecting ground, the whole 200 feet of waterway should be provided.

The Manager then forwarded a copy of a letter addressed by him to the Director-General of Railways in which he recommends the filling in of the pile bridge and Port Officer and asked for permission of the Madras Government to fill in the pile bridge.

The letter was transferred to the Chief Engineer, Public Works Department, with a note by the Consulting Engineer for Railways stating that the waterway now afforded was as under:—

Pile bridge, 4 spans of 24 feet =	...	...	...	...	Feet.
Bridge at A., 3 spans of 40 feet =	...	...	...	...	96
	...	...	...	...	120
	...	...	...	...	216
	...	...	...	...	216

and recommending that the pile bridge should be closed and that if any additional waterway were found to be needed, it should be given at A.

The Chief Engineer replied that he had no objection to the pile bridge being closed and the Manager was informed accordingly.

The Manager then wrote again forwarding a copy from the Director-General of Railways in which the latter informs him that the pile bridge may be filled in if the Government of Madras desire it, but that it should be kept open until a distinct request is made.

The Chief Engineer, on being referred to, declined to make such request but said he had no objection.

This reply was communicated to the Manager.

The Manager has now been asked why he is filling in the bridge, and he replies as follows:—

"The pile bridge could not be left as it was, the piles being worm-eaten and the bridge dangerous. The swamp line may be required at any moment for carrying traffic to and from the wharf if there is any slip in Ross Hill cutting. To keep the original amount of waterway would involve entire reconstruction of the bridge—an expensive business; I compromised matters by putting in as many iron pipes (which were available from the Kistna bridge) as possible between the spans and filling them over with stone."

Although not bearing immediately on the case two letters should be mentioned, one from Mr. J. R. Bell in December 1893 in which he discusses the various possible approaches to the port and says Mr. Willock prefers the seaward approach through the town (plotted by guess on the sketch-plan, no plan being on record). The other letter is from Mr. Willock to Mr. Bell in which he recommends the seaward approach.

An extract from the Government Inspector of Railway's report for half-year ending June 1895 is also given below with the Senior Inspector's note thereon:—

"*Vizagapatam goods terminus.*—Reclamation works are in progress along the foreshore of creek in order that all goods arriving for shipment may be delivered at the wharf in close proximity to the boats. The approach to the wharf is liable to interruption from slips in the deep Ross Hill cutting and has the further disadvantage of involving a back shunt. The alternative swamp line is not used owing to the timber bridge of 4 spans of 24 feet at the eastern end being considered unsafe. Fears have been expressed that if this opening were closed, the régime of the creek would be altered owing to the upper opening of 3 spans of 40 feet, not allowing a sufficient quantity of water to be impounded. There seems to me to be little fear of this happening and the closing of the eastern bridge would, I think, improve matters by giving the scour a more direct line. The best course would seem to be to fill in the timber bridge and watch results; if a tendency to silt was observed, the remedy would be found in increasing the waterway of the 3/40 feet bridge."

There is nothing in the papers to show that any such promise was given by the Manager to the Collector. As far as the Government of Madras is concerned, it has expressed its opinion after consulting the Chief Engineer, Public Works Department, the Consulting Engineer for Railways, and the Presidency Port Officer and the Collector that the pile bridge may be filled in. The Collector was given an opportunity of expressing his opinion, but as shown above preferred to wait till his own and Mr. Bell's proposed alignment through the town had been matured. This proposal, however, was not accepted by the Government of India.

It does not appear that there is much harm done. The swamp enclosed by the railway is by no means cut off from tidal action, as there is still 120 feet waterway in the bridge marked A (besides these pipes at the site of the pile bridge) and it is understood that this is sufficient and is in a better situation than the old pile bridge.

(Signed) C. W. HODSON,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

OOTACAMUND,
9th May 1896.

Note by the Chief Engineer, Public Works Department.

The note by the Joint Secretary, Railway Branch, explains fully the circumstances of the case.

2. I cannot find that any such promise as that mentioned by Mr. Willock was given by the railway authorities, but there was a distinct order from the Consulting Engineer for Railways to the Manager, East Coast Railway, in his letter No. 1792, dated 6th June 1895, stating that the pile bridge should be kept open, the reason why this order was not obeyed being because the piles were rotten and the whole bridge would have had to be reconstructed.

3. The condition imposed on the railway authorities that 200 feet of waterway should be provided* is now broken as by the filling in of the pile bridge, a waterway of only 120 feet is left, and it seems to me that, before the pile bridge was closed, two extra spans of 40 feet should have been

* *Vide* No. 63 R.E., dated 24th January 1894, from Secretary, Government of India, Public Works Department, to Director-General of Railways.

added to the bridge at A ; however this was not carried out, and all that can be done now is to see if the present waterway of 140 feet is sufficient for the tidal action, and if not, the railway authorities should be made to increase it.

(Signed) D. McNEIL CAMPBELL, Colonel, R.E.,
9th June 1896. Chief Engineer, P.W.D.

ORDER—No. 1847 W., dated 20th June 1896.

The note by the Chief Engineer, Public Works Department, recorded above, will be communicated to the Railway Branch with an intimation that, under the circumstances, His Excellency the Governor in Council will not insist on the 200 feet of waterway, as previously stipulated, being now provided ; but that if the 120 feet of waterway left proves to be insufficient, it must be increased, at the expense of railway funds, by adding to the bridge at A two extra spans of 40 feet each.

2. The Superintending Engineer, I Circle, will watch the effect of filling up the pile bridge and report the result a year hence.

(True Extract.)

(Signed) D. McNEIL CAMPBELL, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.

To the Railway Branch.

- " Superintending Engineer, I Circle, with sketch.
- " Collector of Vizagapatam, through the Revenue Department.
- " Marine Department.

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1896} Madras.
PUBLIC WORKS.

No 492. Mar: d / 8 July 96.

*Commnd: to the
Presy. Port officer.*

*sgt Dmc N. C
W
marinel*

Dated June, 20th.

Recd

Encl.

G.O. No. 1847 W., 20th June 1896.

JUNE.

Railway Bridge across the
Vizagapatam backwater

Passing orders on the correspondence
relating to the —.

The P.P.O.

No. 1847 W., 20TH JUNE 1896.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

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Read—also the following papers :—

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The Collector states that, in 1893, when it was decided to abandon temporarily the Ross Hill cutting at Vizagapatam and to give access to the port by a line skirting Ross Hill on the south-west, he objected to the proposal and only withdrew his opposition on the railway authorities undertaking to cross the backwater on a bridge of wooden piles. This promise he states has not been kept and reports that the railway authorities propose to block up the arm of the backwater altogether.

The history of the case appears to be as follows :—

Since the year 1858, numerous proposals have been put forward for improving the harbour at Vizagapatam. The Government of Madras came to the conclusion that it would not be possible for a reasonable sum of money to construct a harbour at Vizagapatam, but, on the construction of the East Coast Railway being sanctioned, the Secretary of State considered that the matter deserved further consideration, and in 1891 Mr. Thorowgood, an expert in these matters, was commissioned by the Secretary of State to make a further report.

It will be seen that a feature of Mr. Thorowgood's report (paragraphs 27 and 37) was to increase the tidal capacity of the estuary by removing the reclaimed land lying between high and low water. (See sketch.)

The Chief Engineer to Government of Madras, Public Works Department, in commenting on Mr. Thorowgood's report, considered that the proposal to increase the tidal capacity of the estuary was a good one pointing out the injury done to the port by the reclamation of land once covered by the tides.

In 1893 the Engineer-in-Chief, East Coast Railway (Mr. Spring), reported that the approach to the port through Ross Hill cutting (900 feet long and 98 feet deep in the deepest part) was becoming unsafe owing to the unstable character of the rock. It was not possible to flatten the slopes, because this would involve the destruction of a Mahomedan mosque on one side and a Roman Catholic church on the other. Under these circumstances he proposed a line (called hereafter the swamp line) skirting Ross Hill on the south-west and giving better access to the port than the old line through the cutting. He proposed one 40 feet opening for flood-water.

This letter was transferred to the Director-General of Railways who requested that the views of the Madras Government might be communicated. The papers were then transferred to the Revenue and Marine Departments, and a report was made by the Presidency Port Officer Captain Street. This was forwarded to the Government of India with a letter recommending that the Ross Hill cutting be abandoned and used for cart traffic and that the swamp line should be adopted.

This letter was despatched on the 18th October 1893 and on the 20th a reference from the Revenue Department was received containing a letter from the Collector Mr. W. A. Willock stating that the proposals for an approach to the port were being recast by Mr. J. R. Bell, the Engineer-in-Chief, and that the plan (Mr. Spring's) forwarded to him for report was now abandoned and asking that he might be allowed to defer his report till Mr. Bell had matured his new proposal. He adds that, in the improbable event of Mr. Spring's views being taken up, he would at once report on the subject. This letter was not forwarded to the Government of India, as it contained no information on the point at issue.

The Government of India, on receiving Commander Street's report and the recommendations of the Madras Government, remarked that the proposed line (the swamp line) would cut across the reclaimed land which Mr. Thorowgood proposed to cut away (*vide* paragraph 37 of his report above alluded to) and suggested that the Chief Engineer, Public Works Department, Madras, should express his views as to how far the proposed line affected Mr. Thorowgood's scheme.

The Chief Engineer reported that there was no objection to the line provided that a total waterway of not less than 300 feet was provided.

This letter was communicated to the Government of India who replied in January 1894 to the effect that the swamp line was approved provided that a total waterway of not less than 200 feet was given in the bank to the west of Ross Hill.

In March 1894 the Manager, East Coast Railway (Mr. Brereton), reported that he had inspected the alignment with Commander Street and that the conclusion arrived at was that the embankment ought to be continuous at the crossing of the backwater, the reason being that the water issuing from this opening at ebb tides strikes the main ebb at right angles and causes an eddy which has the effect of scouring a deep hole near the Pontoon bridge and throwing up a sand bank just beyond in the middle of the stream. He proposed therefore to close this opening and give another opening of 3 spans of 40 feet higher up.

The Manager was informed that the waterway to be given depended on the amount of water to be discharged between tides, and, as there was no diminution of the collecting ground, the whole 200 feet of waterway should be provided.

The Manager then forwarded a copy of a letter addressed by him to the Director-General of Railways in which he recommends the filling in of the pile bridge and says he is supported in this view by the Port Officer, Vizagapatam, and the Presidency Port Officer and asked for permission of the Madras Government to fill in the pile bridge.

The letter was transferred to the Chief Engineer, Public Works Department, with a note by the Consulting Engineer for Railways stating that the waterway now afforded was as under:—

Pile bridge, 4 spans of 24 feet =	96
Bridge at A., 3 spans of 40 feet =	120
Total	216

and recommending that the pile bridge should be closed and that if any additional waterway were found to be needed, it should be given at A.

The Chief Engineer replied that he had no objection to the pile bridge being closed and the Manager was informed accordingly.

The Manager then wrote again forwarding a copy from the Director-General of Railways in which the latter informs him that the pile bridge may be filled in if the Government of Madras desire it, but that it should be kept open until a distinct request is made.

The Chief Engineer, on being referred to, declined to make such request but said he had no objection.

This reply was communicated to the Manager.

The Manager has now been asked why he is filling in the bridge, and he replies as follows:—

"The pile bridge could not be left as it was, the piles being worm-eaten and the bridge dangerous. The swamp line may be required at any moment for carrying traffic to and from the wharf if there is any slip in Ross Hill cutting. To keep the original amount of waterway would involve entire reconstruction of the bridge—an expensive business; I compromised matters by putting in as many iron pipes (which were available from the Kistna bridge) as possible between the spans and filling them over with stone."

Although not bearing immediately on the case two letters should be mentioned, one from Mr. J. R. Bell in December 1893 in which he discusses the various possible approaches to the port and says Mr. Willock prefers the seaward approach through the town (plotted by guess on the sketch-plan, no plan being on record). The other letter is from Mr. Willock to Mr. Bell in which he recommends the seaward approach.

An extract from the Government Inspector of Railway's report for half-year ending June 1895 is also given below with the Senior Inspector's note thereon:—

"Vizagapatam goods terminus.—Reclamation works are in progress along the foreshore of creek in order that all goods arriving for shipment may be delivered at the wharf in close proximity to the boats. The approach to the wharf is liable to interruption from slips in the deep Ross Hill cutting and has the further disadvantage of involving a back shunt. The alternative swamp line is not used owing to the timber bridge of 4 spans of 24 feet at the eastern end being considered unsafe. Fears have been expressed that if this opening were closed, the régime of the creek would be altered owing to the upper opening of 3 spans of 40 feet, not allowing a sufficient quantity of water to be impounded. There seems to me to be little fear of this happening and the closing of the eastern bridge would, I think, improve matters by giving the scour a more direct line. The best course would seem to be to fill in the timber bridge and watch results; if a tendency to silt was observed, the remedy would be found in increasing the waterway of the 3/40 feet bridge."

There is nothing in the papers to show that any such promise was given by the Manager to the Collector. As far as the Government of Madras is concerned, it has expressed its opinion after consulting the Chief Engineer, Public Works Department, the Consulting Engineer for Railways, and the Presidency Port Officer and the Collector that the pile bridge may be filled in. The Collector was given an opportunity of expressing his opinion, but as shown above preferred to wait till his own and Mr. Bell's proposed alignment through the town had been matured. This proposal, however, was not accepted by the Government of India.

It does not appear that there is much harm done. The swamp enclosed by the railway is by no means cut off from tidal action, as there is still 120 feet waterway in the bridge marked A (besides these pipes at the site of the pile bridge) and it is understood that this is sufficient and is in a better situation than the old pile bridge.

OOTACAMUND,
9th May 1896.

(Signed) C. W. HODSON,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

Note by the Chief Engineer, Public Works Department.

The note by the Joint Secretary, Railway Branch, explains fully the circumstances of the case.

2. I cannot find that any such promise as that mentioned by Mr. Willock was given by the railway authorities, but there was a distinct order from the Consulting Engineer for Railways to the Manager, East Coast Railway, in his letter No. 1792, dated 6th June 1895, stating that the pile bridge should be kept open, the reason why this order was not obeyed being because the piles were rotten and the whole bridge would have had to be reconstructed.

3. The condition imposed on the railway authorities that 200 feet of waterway should be provided* is now broken as by the filling in of the pile bridge, a waterway of only 120 feet is left, and it seems to me that, before the pile bridge was closed, two extra spans of 40 feet should have been

* *Vide* No. 63 R.E., dated 24th January 1894, from Secretary, Government of India, Public Works Department, to Director-General of Railways.

added to the bridge at A; however this was not carried out, and all that can be done now is to see if the present waterway of 140 feet is sufficient for the tidal action, and if not, the railway authorities should be made to increase it.

9th June 1896.

(Signed) D. McNEIL CAMPBELL, Colonel, R.E.,
Chief Engineer, P.W.D.

ORDER—No. 1847 W., dated 20th June 1896.

The note by the Chief Engineer, Public Works Department, recorded above, will be communicated to the Railway Branch with an intimation that, under the circumstances, His Excellency the Governor in Council will not insist on the 200 feet of waterway, as previously stipulated, being now provided; but that if the 120 feet of waterway left proves to be insufficient, it must be increased, at the expense of railway funds, by adding to the bridge at A two extra spans of 40 feet each.

2. The Superintending Engineer, I Circle, will watch the effect of filling up the pile bridge and report the result a year hence.

(True Extract.)

Under Secy. to Govt., P.W.D.

To the Railway Branch.

- „ Superintending Engineer, I Circle, with sketch.
- „ Collector of Vizagapatam, through the Revenue Department.
- „ Marine Department.

Exd. Md, Pahlivan.

Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1896} Madras.
PUBLIC WORKS.

Dated June, 20th.

Recd

Encl.

G.O. No. 1847 W., 20th June 1896.

JUNE.

Railway Bridge across the
Vizagapatam backwater

Passing orders on the correspondence
relating to the —.

MARINE G. No. 754.

247 mar 9.4.96 Recd 8.7.96

B

No. 492 mar 8. July 1896

Communicated to
the Presidency Port
office

8/7/96

DEPT. OF
15 JUL. 96

The P.P.O. with
R.S.

21/7 1897

1896.

Public Works Department.

No. 1954 W
Dated 3rd July 1896.
Despatched
Received

SUBJECT.

Communicating to the Examining
P.W. Accts. Financial G.O.
directing the Accountant
General to place a certain sum
at the disposal of the P.W.D.
from Port Funds for repairs to
the New Pier at Tuticorin.

P. W. 50

P. W. 40.
2,000-0-0-00

xm

425 mar 9.13. 6.9.96 sk. 7.9.96
307 mar 8.5-5-96.

B

No. 493 mar 8. July 1896

Communicated
to the Presidency Port
office

8/7/96

DESPATCHED
17 JUL. 96

The P.P.O. with a copy of
G.O. 1518 W of 14 May 1896.
R.S. related to P.W. records

B

21/7 1897

1954 W

1896.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Read the following
Financial Department.

Proceedings of the Madras Government.

Read the following paper:-

Proceedings of the Public Works Department, dated 14th

May 1896, No. 1518 W.

Order thereon:-No. 354, dated 2nd June 1896.

The Accountant-General will place the sum of Rs. 12450 at the disposal of the Public Works Department from Port Funds.

(True Extract)

(sd) W.W. Phillips

Ag: Assistant Secretary,

for Chief Secretary.

Order thereon:-

No. 1954 W, dt 3rd July 1896.

Communicated to the Examiner, P.W. Accounts.

2. The amount will be distributed as shown below:-

Works	-	-	Rs. 10,000
Establishment	-	-	" 2,300
Tools and Plant	-	-	" 150
			Total Rs. 12,450

(True Extract)

C. R. Boulton.

Under Secretary to Govt: P.W.D.

The Marine Department. ✓

" Examiner, P.W.D., with copy of G.O. No. 1518 W, dated 14th May 1896.

GOVERNMENT OF MADRAS.

MARINE DEPARTMENT.

READ—the following paper :—

From Commander H. A. STREET, R.I.M., Presidency Port Officer, Madras, to the Joint Secretary to Government, Marine Department, dated 25th June 1896, No. 1271/213 G.

With reference to the two designs (herewith sent) of buildings, referred to in Public Works Department memo. No. 281 E., dated 23rd May 1896, and paragraph 20, page 60, of G.O., Marine, No. 245 of 8th April 1896, I have the honour to state that, for the better class of keepers, the design for "Bandsmen's quarters" appears suitable, and that I see no objection to the lower class of keepers being provided with quarters constructed in accordance with the "standard design for Police lines," provided that in exposed situations the buildings are constructed of stone or brick in chunam, as quarters built of mud would be unlikely to last in such situations.

2. If latrines are provided, it will be necessary to entertain a sweeper specially for keeping the places clean.

ORDER—No. 494, Marine, dated 10th July 1896.

The designs are approved, so far as accommodation is concerned, for adoption as type designs, but the Government is not prepared to entertain sweepers in any case. The latrines should, therefore, be omitted from the designs. One quarter only instead of a block should be shown on the type plans.

2. The Presidency Port Officer will, on the re-organization of the Lighthouse establishments being finally approved by Government, specify distinctly the classes of keepers that are to be provided with quarters on the larger and smaller scale, respectively.

(True Extract.)

Under Secretary to Government.

To the Public Works Department, with two plans.
,, Presidency Port Officer.

Exd. T. K. Narayana Aiyangar.
Spare Copies

Gobt. of {1896} Madras.
MARINE.

Dated July, 10th.

Recd.

Encl.

G.O. No. 494, 10th July 1896.

JULY.

Type designs for Lightkeepers' quarters

Approving, with remarks, certain designs for adoption as —, and directing the Presidency Port Officer to specify, on the re-organization of the Lighthouse establishment, the classes of keepers that are to be provided with quarters on the larger and smaller scale, respectively.

Heading.
Lighthouses.

No. 1271/213 g

Presidency Port Office,
Madras, 25 June, 1896.

From

Commander H. A Street, R.I.M.,
Presidency Port Officer,
MADRAS.

To

The Secretary to Government,
Marine Department,
CHENNAI.

Sir,

With reference to the two designs (herewith sent) of buildings, referred to in P.W.D. Memorandum No. 281 E., dated 23rd May 1896, and para 20, page 60, of G.O. Marine, No. 245 of 8th April 1896, I have the honour to state that, for the better class of keepers the design for "Bandsmen's Quarters" appears suitable, and that I see no objection to the lower class of keepers being provided with quarters constructed in accordance with the "Standard Design for Police Lines", provided that in exposed situations the buildings are constructed of stone or brick in chunam, as quarters built of mud would be unlikely to last in such situations.

2. If latrines are provided, it will be necessary to entertain a sweeper specially for keeping the places clean.

I have the honour to be,

Sir,

Your Obedient Servant,

H. A. Street

Commr., R.I.M.,
Presidency Port Officer.

MARINE G. NO. 714

Recd 24.6.96
Env 2 plans

Marine (1896) DEPARTMENT.

From

THE PRESIDENCY PORT OFFICER,

Madras,

To

THE CHIEF SECY. TO GOVERNMENT,

MARINE DEPARTMENT,

Fort St. George.

No. ¹²⁷¹
~~1421~~
213 9

Dated 25th } June 1896.
Received }

No. _____

Subject.

Returning with remarks
two designs regarding
quarters for lightkeepers

281/4

281 Ed/23.5.96.

263 Ed/15.5.96.

245 Marine d/8.4.96

Q.O. 494^{Mar}
10.7.96 Marine
PUBLIC WORKS DEPARTMENT.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

READ the following

Letter from the Presy. Port Officer (H.E. No. 1271 d/25 June 96)
213 9

The designs are
So far as accommodation is concerned
approved for adoption as
type designs. They will be
issued accordingly in the
Public Works Department,
one quarter only, instead
of a block, being shown
on the type plans.

ASH

27.96

Should add that we are
not prepared to entertain
differences in any case & that
therefore it is the intention from
the design these men must
make their own sanitary arrange-
ments as other people do.

4/7/96

28
6/7/96

2. The Presidency Port
Officer with, on the
reorganisation of the
Lighthouse Establishment
being finally approved
by Government, specify
distinctly the classes

10 of keepers that are to
be provided with quarters
on the larger and smaller
T scale, respectively.

1/2
20/6/96

M

Circ
Type designs for
Light Keepers quarters

~~The Hon Mr Bhai C.R.~~
~~The Hon Mr Gopal C.R.~~

Superseded
9/12/96

To
The Public Works Dept
with 2 plans.
Pres Port Officer

CHS 47

Marine

PUBLIC WORKS DEPARTMENT.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Read the following

Letter from the Pres Port Officer (H.E. No. 1271 of 25 June 96)
213 G

No. 494 Marine 8 10 July 1896

The designs are
approved, so far as ac-
commodation is concerned
for adoption as type
designs, but the Govt
is not prepared to entertain
sweepers in any case.
The latrines should,
therefore, be omitted
from the designs. One
quarter only instead of
a block should be
shown on the type plans.

2. The Presidency Port

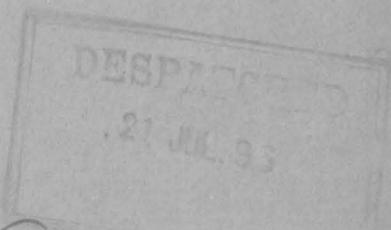
of Officer will, on the
 reorganisation of the
 or Light House Establishments
 as being finally approved
 by Government, specify
 distinctly the classes
 of Keepers that are to
 be provided with quarters
 on the larger and smaller
 scale, respectively.

[Signature]
 6/4/86

281E 23-5-96
 263E 15-5-96
 245-6 merged 8-4-96
 Type designs for
 Light Keepers' quarters

Revised draft

He P.W.D. with 2 plans.
 " P.P. Officer



[Handwritten notes at top: 281E 23-5-96, 263E 15-5-96, 245-6 merged 8-4-96]
 I do not think the design
 for bandmen quarters is
 answerable. The
 accommodation is sufficient
 for them in the present for
 any ornamentation.
 No estimate for ornamenting
 been prepared.

[Signature]
 30/6/86

W Please see proposed
 additions to para 1 of the
 draft order. The papers
 are now in the Marine
 Dept. The details of the
 design can, if necessary,
 be considered by the
 Chief Engineer when the
 papers are in the P.W.D.
 when the C.A. can be
 directed to omit the
 ornamentation & prepare
 an estimate of quantities

[Signature]
 30 June 86

CN 7/4
Govt. of Madras.
PUBLIC WORKS.

name

13/7/97

26 Dec 19
22/1/97
G.O. 168, Mar, of 26.2.97
" 261, Mar, of 24.8.95
" 238, Mar, of 7.8.95

Date

Recd.

Encl.

G.O. 60/7/1896 No. 494 Mar

re designs for Light
Keepers' quarters.

Approving with remarks
certain designs, ~~and~~
for adoption as —,
and directing the P. P. Officer
on the reorganization of the lighthouse establishment,
to specify the classes of
keepers that are to be
provided with quarters on
the large & small scale
respectively.

50
3

13/7. Tw 3/7