GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

Read—the following papers:—

Letter from the President, District Board, South Canara, dated 20th July 1894, No. 1166.
,, ,, ,, ,, 23rd Oct. ,, ,, 1980.
,, ,, ,, ,, 31st ,, ,, ,, 2054.
,, ,, ,, ,, 8th Nov. ,, ,, 2076.
,, ,, ,, ,, 15th ,, ,, ,, 2136.
,, ,, ,, ,, 21st ,, ,, ,, 2188.
,, Superintending Engineer, IV Circle, ,, 6th Feb. 1895 ,, 54 W.

Note by the Chief Engineer, Public Works Department.

The Chief Engineer has considered the subject very carefully and is satisfied that the proposed bridge is quite safe.

(Signed) J. PENNYCUICK, Colonel, R.E.,
Chief Engineer, P.W.D.

Order—dated 1st May 1895, No. 1028 W., Public Works.

The estimate, amounting to Rs. 27,200, for the construction of the Sullya bridge in the South Canara district is sanctioned.

2. This sanction has been registered as Local No. 2 W. of 1895-96 and classified as Communications, Original Works.

(True Extract.)

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

To the Superintending Engineer, IV Circle, with enclosures.
,, Local and Municipal Department.

Exd. C. A. Munisawmy.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1895} Madras.

PUBLIC WORKS.

Dated May, 1st.

Recd. *Encl.*

G.O., 1st May 1895, No. 1028 W.

MAY.

Sullya bridge

Estimate amounting to Rs. 27,200 for the construction of the — in the South Canara district, sanctioned.

List of papers relating to the estimate of the Sullia bridge sent to the Chief Engineer, Public Works Department, Madras, with letter No. [illegible] dated 20th July 1894.

— —

1. Copy of letter No. $\frac{290}{27.1.93}$ from the Local Fund Engineer, South Canara, to the President, District Board, South Canara.
2. " letter No. $\frac{1434}{27.9.93}$ from the President, District Board, to the Superintending Engineer, Fourth Circle.
3. " letter No. $\frac{418\ M}{2.10.93}$ from the Superintending Engineer, in reply to the above.
4. " letter No. $\frac{274}{7.2.94}$ from the Local Fund Engineer, to the President, District Board.
5. " letter No. $\frac{162}{13.2.94}$ from the President, District Board to the Superintending Engineer, 4th Circle.
6. " letter No. $\frac{84\ M}{4.3.94}$ from the Superintending Engineer in reply to the above.
7. " letter No. $\frac{132}{9.7.94}$ from the Local Fund Engineer, to the President, District Board.

S. Canara District Board's Office,
Mangalore, 20th July 1894.

For President,
District Board.

Rw E D
5607/54

No 290.

District Engineer's office,
South Canara,
Station, Mangalore.
27th January 1893.

From
John B. Macfarlane Esquire,
District Engineer,
South Canara.

To
The President, District Board,
South Canara.

Sir,

Enclosures.
Estimate. }
Report. } 1.
Specification. }
— Plans.
New Bridge — 1.
Old — 1.
Index map — 1
4

In accordance with the decision of the District Board at their last Budget meeting, I have now the honor to forward herewith an Estimate amounting to Rs 33174 together with plans, detailed estimate, Report and Specification for constructing a granite arched masonry bridge of two spans of 40 feet each in the clear, over the Sullia river in the 52d mile of road No 1 from Mangalore to Mercara.

2. As you are aware, the old bridge that spanned this river collapsed in July of last year, during the heaviest part of the monsoon. The bridge was a very old one, and on a former occasion some 23 years back, gave way in a similar manner. New arches were then turned on the old masonry, and the bridge has served till now for traffic purposes. What is left of the old masonry, is now in such a dilapidated condition that it is not expedient to do anything in the way of repairs to it, but rather to introduce an entirely new bridge altogether and built of a much more serviceable material. The Board have concurred

[illegible]

in this [illegible] on a former report, the design and estimate now submitted is in accordance with the class of bridge they decided to adopt for this river. As the work is fully detailed in the papers attached, and illustrated in the drawings accompanying, it is not necessary to further particularize it here, than to state it is in every way suitable for the purpose intended.

3. As the late President took a marked interest in the improvement of communications throughout the District, several large bridges having been erected during his tenure of office, and as he took a special interest in this bridge in particular, I have the honor respectfully to suggest for the favourable consideration of the Board, that the bridge be named after the late President, and that for the future, it be known as the "Brodie bridge". The class of work is of so permanent a nature, that it is in every way suited to commemorate the services of an officer, so respected and esteemed by all throughout South Canara.

4. In conclusion, I have to request that you will be good enough to solicit the Superintending Engineer to delay the passing of the plans and estimates as little as possible. If I get them back sanctioned soon, it will be possible to get in the foundations before the coming monsoon, please see para 5 of the report.

I have &c.
(Signed) John B. MacFarlane
District Engineer
S. Canara.

[illegible]
for President

R 22
5807 | 54

No. 1434

South Canara District Board Office,
Mangalore, 27th September 1893.

From

G. T. T. Power Esquire,
President, District Board,
SOUTH CANARA.

To

The Superintending Engineer,
Fourth Circle,
Coimbatore.

Sir,

I have the honor to forward herewith for scrutiny and submission to Government an estimate* amounting to Rs. 33,174 for the construction of a granite bridge over the Sullya stream in the 52nd mile of Road No. 1 from Mangalore to Mercara via the Sampaje Ghaut.

* Detailed estimate. Abstract — do — Report. Specification.	1.
Plans.	2.
Index map.	1

2. The old laterite bridge appears to have been constructed before 1852, probably at the time when the Sampaje Ghaut road was being laid out, and renewed in 1869. It collapsed during the heavy monsoon of last year. The Local Fund Engineer proposed to replace it by an iron bridge at a rough cost of Rs. 20,000, but the District Board preferred a granite bridge as being more durable and in the long run more economical than an iron bridge notwithstanding the greater initial outlay. The Board argued that while an iron bridge lasts for about 50 years or so, a granite bridge

may last for ten times as many years and accordingly voted for a granite one. The estimate now forwarded is prepared in accordance with this decision of the District Board.

3. What is left of the old bridge is so dilapidated as to be quite unserviceable, so that an entirely new bridge has to be constructed from foundation to finish. The number of spans provided in the design for the new bridge is the same as in the old bridge viz: 2, with a waterway of 1706 square feet. The superstructure will rest on a solid rubble foundation laid on a bed of concrete at a depth of 8 feet below the river bed. The bridge will provide a roadway of clear 18 feet over the stream.

4. In accordance with the estimate tenders were called for. Only two tenders were received but were rejected, both being considerably over the estimated cost.

5. The District Board being unable to provide the whole cost of the bridge in one year, it is proposed to distribute the cost over 3-years and to get the work finished before 1895-96. A sum of Rs 15,000 has been provided for expenditure on the work in the current year's budget, and I request you will be so good as to obtain

sanction

sanction of Government to the estimate at an early date in view to the amount allotted being utilized before the close of the year.

6. A copy of the District Board's resolution sanctioning the estimate is enclosed.

I have &ca

(Signed) G. Power.
President.

(True copy)

P. Aunt

For President.
District Board.
South Canara.

W.

Pw C 6
5609/94

No. 418/m

Superintending Engineer's office, 4th Circle,
Coimbatore, 2d. October 1893.

From

Lt. Col: A. W. Smart, R. E.;
Superintending Engineer, 4th Circle.

To

The President, District Board,
South Canara.

Sir,

Encloo: 7.
1. Detailed Estimate.
1. Abstract - do -
1 Report.
1 Specification.
2 Plans.
1 Index map.
7

With reference to your letter No. 1434, dated 27th September 1893, I have the honor to request that you will inform me how many square miles the stream above the point at which the bridge at Sullia is to be built, drains. In para 5 of the District Engineer's report it is stated that "there is no reason to suppose that the waterway originally allowed to this bridge was insufficient", but no evidence is brought forward to support this statement. There are no cross sections of the stream above the bridge, with marked flood levels so that it is impossible for me to judge if the waterway allowed is sufficient. I request that this defect may be remedied, two or three sections above will be sufficient within 1/2 mile intervals.

2. The nature of the subsoil is not ~~is~~ stated so that the sufficiency or otherwise of the foundations allowed cannot be judged, though the report states that the foundations should be taken down till hard soil is met, a very unsatisfactory way of forming an Estimate of cost.

A boring should be made to ascert

the subsoil.

I have &c.

(Signed) A. W. Smart. Lt. Col: R.E;
Supg. Engineer, 4th Circle.

No 1493.

True copy with enclosures forwarded to the Local Fund Engineer, South Canara, for compliance.

Mangalore
7th October 1893.

(Signed) D. Ananthaya.
For President.
District Board.

(True Copy)

For President.
District Board.
South Canara.

PWS-5
5607/54

No 274.

District Engineer's office,
South Canara,
Camp. Sullia,
7th February 1894.

From
John B. Macfarlane Esquire,
District Engineer, South Canara.

To
The President.
District Board,
South Canara.

Enclosures.

Detailed & Abstract estimates, Report & Specification	1
Bridge plan.	1
River sections.	1
Old plan of bridge.	1
Plan showing positions of borings taken	1
Plan of Catchment basin	1
Index map.	1
Data sheet.	1.
	8

Sir,

In compliance with your endorsement of the 7th October last, No 1493, on a letter from the Superintending Engineer, 4th Circle, returning the Plans and estimates of the Sullia bridge for certain information, I have the honor now to resubmit these plans and estimates, with all the information called for given, and to remark as follows:-

2. Catchment area of Basin drained. - This has been computed from the ordinance sheet, and is taken at 27 square miles. An enlargement from the ordinance map showing the basin in question is submitted for verification. Scale of enlargement is 1 inch to the mile. Referring to the register of rainfall for the past 10 years maintained at Puttur 21 miles away I find that the heaviest fall in any 24 hours was during the month of October 1887, when 13·23 inches were recorded. I may here remark that this appears to be very exceptional, in no other year during the past decade has it come within 50% of this, except in August 1884, when 10·40 inches appears to have been registered. If

the

the figures before me are correct on no other occasion has the rainfall reached half the above amount except those stated.

3. Croſs Sections:— Four croſs sections of the river have been taken, one immediately above the old bridge site, and the other three at intervals of about half a mile up stream. They have been plotted to a natural scale of 20 feet to the inch and high water levels, as shown by the residents in the neighbourhood have been marked thereon. Regarding the extreme apparent height of flood level I have to point out that this is caused by the ponding up of the water when the adjacent large river ("Puiswanni") is in high flood, and when this is so there is practically little current in the Sullia river. Taking a rainfall of 13·25 inches as a maximum, in a catchment Basin of 27 Square miles, we get a groſs discharge of 9,612 cubic feet per second, allowing 50% for a run off we get an actual discharge of 4806 cubic feet per second to be provided for. The total area of the openings in the bridge in question is 1706 Square feet, this gives us a maximum velocity during exceptional floods of 3 feet per second nearly (rather under in fact) which cannot be considered too much.

2·82 ft

4. Nature of Sub-soil.— This has now been thoroughly tested by means of borings, a plan of the old bridge is submitted showing positions the tests were made at,

and

and the depths reached are marked, as well as levels for comparison with sections &c. &c. The result of this investigation has been most satisfactory, rock under abutments and wings has been met with in either bank at a level of 30·12, thus obviating the neceſsity of providing the foundations originally anticipated. Below the peir site rock has been met with at a mean level of 25·12 or 5 feet lower than that under abutments. A very large saving in the original estimate is thus effected, viz: Rs 5579; neceſsary corrections have been made and the estimate and plans are herewith returned.

5. The Superintending Engineer in returning the Kadimbilla bridge plans made some observations regarding the reduction of the splay given to the wing walls of that masonry, in case he might wish similar alterations in this, I have shown by blue dotted lines on the plan what I propose to alter it to, and if this change is desirable, the wings will be built accordingly. He further suggests, regarding the masonry, that it is unneceſsary to construct the whole superstructure with granite. We are in the habit of calling our local stone, granite, but it is a misnomer, and the stone referred to is Gneiſs. By the burning proceſs we obtain this in varying thickneſses from 4 to 12 inches, the latter size is rarely obtained; 6 to

8 inches is considered the average. To bond this strongly with rubble will be somewhat difficult and selected rubble stone will have to be made for each course, this will enhance the rate for that class of ~~ws~~ stone and after all effect very little saving if any. I trust therefore that the Superintending Engineer will not press this point. Alterations in Specification for composition of mortar are noted and will be attended to. Data for the rates allowed are submitted as far as practicable.

6. In conclusion I have the honor to request that the earliest orders may be issued regarding this important work. The week's sojourn I have just had here, shows what a terrible obstacle to traffic the want of a bridge across this river is.

I have &c.
(Signed) John B. Macfarlane,
District Engineer,
South Canara.

(True copy)

For President,
District Board,
South Canara.

Ord E.C.
5607/94

№ 112

South Canara District Board Office,

Mangalore, 13th February 1894.

From

G. F. T. Power Esquire,
President, District Board,
SOUTH CANARA.

To

The Superintending Engineer,
Fourth Circle,
Coimbatore.

Sir,

With reference to your letter No. 418/m dated 2d October 1893 I have the honor to return herewith the plan and estimate of the Sullia granite bridge together with the other enclosures named in the margin giving information on the several points noticed by you in the letter.

Detailed and abstract estimate, Report and Specification	1
Bridge plan.	1
River Sections.	1
Old plan of Bridge	1
Plan showing positions of Borings taken.	1
Plan of catchment basin	1
Index map	1
Data sheet.	1.

2. I also enclose for your information a copy of the Local Fund Engineer's letter No. 274/7.2.94 resubmitting the estimate from which it will be seen that the sub-soil at site of the bridge ha been thoroughly tested by means of borings with the result that rock has been met with in either bank at a level of 30-12 and below the pier sit at a mean level of 25-12, thus obviating the necessity of providing the foundations origina

anticip

anticipated and making it possible to reduce the estimate from Rs. 33174 to Rs. 27,595. Necessary corrections have been made in the estimate.

3. I request that under the explanation afforded in para 5 of the Local Fund Engineer's letter the provision for constructing the whole superstructure with granite may be allowed to stand. I also invite your attention to his remarks regarding the reduction of the splay given to the wingwalls.

I have &ca.
(Signed) G. Power.
President.

(True copy)

For President.
District Board.
South Canara.

Pw E-3
5607/92

No. 84 M.

Superintending Engineer's office
4th Circle,
4th March 1894.

From
J. Hannan Esquire,
Superintending Engineer, 4th Circle.

To
The President.
District Board,
South Canara.

Sir,

Enclosures 9.
1 Estimate
1 Specification.
1 Bridge plan.
1 River sections.
1 Old plan of bridge.
1 Plan of positions of Borings taken.
1 Plan of catchment basin.
1 Index Map.
1 Data sheet.
9

I have the honor to return the plans and estimate as per margin for the Sullia bridge forwarded with your letter No. 162 of 13th February with the following remarks:—

The total waterway through the Bridge except a few square feet at top under the arch is blocked up by the ponding back of the water from the main river (Vide para 3 of District Engineer's letter forwarded with your letter under reference, see also elevation of bridge on which the ponded level is shown). There is therefore practically no waterway available for the discharge of the river over which the bridge is to be built.

3. If the District Engineer is right in showing 53·30 as the level to which the main river ponds back, then I have no hesitation in saying that the bridge now designed would be as certainly

carried away as the old one it is intended to replace.

4. The sections of the river submitted by the District Engineer do not appear to be reliable. For instance, the bed of the river 1 mile above the bridge is a foot lower than it is half a mile lower down; this is possible but not probable. The water levels at these points exhibit a similar difference which is a curious coincidence.

5. The District Engineer states that the old bridge collapsed, because it was built with faulty materials (vide para 5 of report accompanying Estimate). It seems strange that a bridge which stood for 23 years (the arches were rebuilt in 1869) should suddenly collapse from this cause.

6. No proper report has been submitted regarding the recent collapse of this bridge. It is very desirable that one should be submitted showing

(a) The condition of the arches before the collapse.

(b) The flood levels above and below the bridge at the time of the accident.

(c) The rainfall registered during the 3 days previous to the collapse at the nearest registering station.

7. In conclusion I have the honor to point out that the waterway to be provided for this bridge must be allowed for above the level to which the main river ponds back.

I have &c.
(Signed) J. Hannan.
Supdg. Engineer, 4th Circle.

No. 328.

True copy, with enclosures, forwarded to the Local Fund Engineer, South Canara for immediate attention.

Mangalore
14th March 1892

(Signed) D. Ananthaya.
For President,
District Board.

(True copy)

For President,
District Board,
South Canara.

Ow 6.2
5607/24

No. 132.

District Engineer's office,
South Canara.
Mangalore, 9th July 1894.

From

John B. MacFarlane Esquire
District Engineer,
South Canara.

To

The President,
District Board,
South Canara.

Sir,

With reference to your endorsement of the 14th March last, No. 328, on a letter from the Superintending Engineer 4th Circle, dated 4th Idem, No. 84 M, I have the honor to inform you that I have again gone into the whole matter of the Sullia bridge question, most carefully on the points raised by the Superintending Engineer, and to remark as follows:—

2. The fonded flood level given by me at the bridge site, viz 50·30 may be taken as more accurate than any of the others recorded at different intervals up stream, reliance had of course to be placed on the information of villagers as to where they had seen the water coming after heavy rains; that recorded at bridge site was given by a road maistry, long in charge of that section of road, as the level which he had repeatedly seen the water standing at, during floods. Regarding the apparent discrepancy of a foot in the levels of the bed of river, where the

bed is shown a mile above the bridge, to be a foot lower (at lowest point) than it is ½ a mile above bridge, I have to state that this is nevertheless correct, the section happened to cross a fairly deep pool formed apparently by scour caused by a sudden bend in the river. But if comparison is made between section No. 1 (Bridge site) and No. 4 (1½ mile up stream) the natural fall of the river can be found.

3. I most respectfully point out, that the remark of the Superintending Engineer, that waterway has to be provided for the discharge of the Sullia stream over and above the level at which the main river stands, of which it is an affluent, appears to me not warrantable from the facts of the case. It will be seen that the still water pond caused by the main river when in maximum flood, extends for over a mile above the site of bridge, and that the level of this pond must therefore be the limiting and ruling level of all flood in the tributary stream. The case is exactly parallel with that of rivers flowing into the sea, on an open coast. The H.T.L. of the latter is the ruling level which limits the surface level of such rivers. If the Superintending Engineer still considers that the bridge must be raised to the height he suggests, entailing a great increase in cost, very long approaches and giving a very unsightly appearance to the structure, I have the honor to request that the papers may be submitted, to the Chief Engineer, Public Works Department, for an expression of opinion and decision in the matter.

4. Referring to para 5, I most respectfully resubmit, that the reason of the collapse was owing to the material with which the old bridge was originally constructed, and not faulty waterway — while it is true that the majority of bridges in the district were built of laterite, it is also true that the majority of them are down, and most of those that remain have had to be strengthened and repaired, (tied with tie rods and plastered) to keep them serviceable.

5. The particulars asked for in para 6 (a & b) are not now available. The total rainfall registered for the 3 days prior to the collapse of bridge was only 0.54 inches i.e. what was registered when the first portion of the bridge came down in June. The bulk of the bridge fell in July, and the highest rainfall registered on any day in that month was 4.90 inches.

6. Drainage area of catchment basin is taken at 27 square miles, the discharge per second from this according to Major Ryves formula is 6075 cubic feet, the resulting velocity through bridge as designed gives 3.5 feet per second, about

7 All papers× are herewith returned, and it is now hoped that the plan and Estimate will be passed and orders issued at an early date to commence the work.

× 8. viz:
1 Estimate & Specification &c.
1. Bridge plan.
1. River Sections.
1 old plan of bridge.
1 Plan of catchment basin.
1 Plan of borings taken.
1 Index map.
1 Data sheet.
8 ..

I have &ca.

(Signed) John B. Macfarlane.
District Engineer
S. Canara.

(True copy)

For President
District Board
South Canara

PWE 1
5607/E4

№ 1166 South Canara District Board Office,

Mangalore, 20th July 1894

From

G. W. Dance Esquire,
President, District Board,
SOUTH CANARA.

To

The Chief Engineer
Public Works Department,
Madras.

Sir,

I have the honor to forward herewith plans× and estimates for the Sullia bridge and copies of correspondence on the subject as per list enclosed.

×
1. Detailed & abstract Estimates, Report and Specification.
1. Bridge plan.
1. River Sections.
1 Old plan of bridge.
1 Plan showing positions of borings taken.
1 Plan of catchment basin.
1 Index map.
1 Data sheet.
8 ..

2. There is a difference of opinion between the Local Fund Engineer and the Superintending Engineer. I request that you will be good enough to decide who is right.

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

President.

Local Fund (1894) Department.

P. W. CURRENT No. 5607

From

The President,
District Board,
South Canara.

To

The Chief Engineer,
Public Works Department,
Madras.

Dated 20th }
Despatched 21st } July 1894.
Recd: 27.7.94
Enclosures. ~~15~~ 16
(6 plans)
No. 1166.

Subject.

Soolia Bridge

Forwarding the plans & estimates of the — together with copies of correspondence on the subject & requesting him to decide who is right as there is a difference of opinion between the Superintending Engineer & the Local Fund Engineer.

Hr
21-VII-94

J

O.L.S.315

South Canara District Board Office

No. 1980

Mangalore 23d October 1894.

From

G. W. Dance Esquire
President, District Board
South Canara

To

The Chief Engineer
Public Works Department
Madras

Sir,

I have the honor to request that you will be good enough to favour me with a very early reply to my letter No. $\frac{1166}{20.7.94}$ regarding the plans and estimates for the Sullia Bridge.

Cur
5607 Sent EW on
29.10.94

I have the honor to be,
Sir,
Your most obedient Servant

for President.

H

P.W. CURRENT No. 8174

Local Fund (1894) Department.

From

The President
District Board
South Canara.

To

The Chief Engineer,
Public Works Department,
Madras.

Dated 23d } September 1894.
Despd 24th }

Recd: 29.10.94
Enclosures none.

No 1980.

Subject.

Plans & Estimates of the Sulliya Bridge.

Requesting an early reply to this office No. 1166/20-7-94 regarding the —

W/ Submitted in continuation of the previous papers.

№ 2054

South Canara District Board Office,

Mangalore, 31st October 1894.

From

G. W. Dance Esquire,
President, District Board,
SOUTH CANARA.

To

The Chief Engineer
Public Works Department Madras.

Sir,

I have the honor to request that you will be good enough to favour me with a very early reply to my letter No. 1166/20.7.94 regarding the plans and estimates for the Sullia Bridge.

Cir 5607 supposed to be with W 14/9/94
DC
6-11-94

I have the honor to be,
Sir,
Your Most Obedient Servant.

For President.

P. W. CURRENT No. 8432

Local Fund (1894) Department.

From

The President,
District Board,
S. Canara.

To

The Chief Engineer,
Public Works Deptt.
Madras.

Dated 31st October
Despd 1st November } 1894.
Recd: 6. 11. 94
Enclosures: None.
No. 2054

Plans and Estimates of the Sullya Bridge —

Requesting the favour of an early reply to this office letter No. 1166 / 20-7-94 regarding the —

W/ Submitted in continuation of C. No 5807
6 Nov 94

№ 2136

South Canara District Board Office,
Mangalore, 15th November 1894.

From

G. W. Dance Esquire,
President, District Board,
SOUTH CANARA.

To

The Chief Engineer
Public Works Department,
Madras.

"Papers with W/
D.C.
20-11-94

Sir,

I have the honor to request your attention to my letter No. 1166 dated the 20th July last regarding the plans and estimates of the Sullya Bridge and to request that you will be good enough to favour me with an early reply.

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

For President.

P. W. C [illegible] No. 8862

Local Fund (1894) Department.

From

The President.
District Board.
South Canara.

To

The Chief Engineer,
Public Works Deptt.
Madras.

Dated 15th. } November/94.
Desp.d 16th. }

Recd. 20.11.94

Enclosures. None.

No. 2136.

Subject.

Plans & estimates of the Sullya Bridge — Requesting the favour of an early reply to letter No. 1166/20-7-94 regarding the —

Record [illegible]

W/ Submitted in continuation of previous papers

20 Nov. 94

No. 2076

South Canara District Board Office,
Mangalore, 8th. November 1894.

From

G. W. Dance Esquire,
President, District Board,
SOUTH CANARA.

To

The Chief Engineer
Madras.

Sir,

I have the honor to request that you will be good enough to favour me with a very early reply to my letter No. 1166/20.7.94 regarding the plans and estimates for the Sullia Bridge.

I have the honor to be,
Sir,
Your Most Obedt. Servant

For President.

W

Papers with W.

D.P.
17-11-94.

P. W. CURRENT No. 8781

Local Fund (1894) Department.

—

From

The President,
District Board.
S. Canara.

To

The Chief Engineer,
Public Works Department,
Madras.

Dated 8th
despatched 10th } November 1894.

Recd: 16.11.94

Enclosures. None.

No. 2076.

—

Subject.

Plans and estimates of the Sullya Bridge—
Requesting an early to this office letter No. 1166/20.7.94 regarding the —

W/ Submitted in continuation of the previous papers;
17 Nov 94

No. 2188

South Canara District Board's office.
Mangalore, 21st November 1894.

From

G. W. Dance Esquire,
President, District Board,
South Canara.

To

The Chief Engineer,
Public Works Department,
Madras.

Sir,

I have the honor to invite your attention to my letter No. 1166, dated 20th July last and the marginally noted reminders regarding the plans and estimates for the Sullya bridge and to request the favour of a very early reply.

Nos. 1689/18.9.94, 1829/6.10.94, 1980/23.10.94, 2054/31.10.94, 2076/8.11.94, and 2136/15.11.94

Papers with do.
27.11.94

I have the honor to be,
Sir,
Your most obedient Servt,

For President.

P. W. CURRENT No. 9054

Local Fund (1894) Department.

From

The President,
District Board,
South Canara.

To

The Chief Engineer,
Public Works Dept.
Madras

Dated 21st } November/1894.
Despatched 22d }
Recd. 2

Enclosure None

No 2188

Subject

Plans & Estimates of the Sullya Bridge - Requesting the favour of an early reply to this office letter No. 1166 20.7.94 regarding the ——

BW / Submitted in continuation of previous papers.
22/11/94

3121C

(drawing No 7)

for the [illegible]

Section of area of [illegible]

[illegible] calculated

[illegible] sectional

establish the

area to be taken

the formula

Q = [illegible]

[illegible] C [illegible] 5

& W = mean sectional area

CWB

4/9 94

7.IX.94

Public Works Department.

Current No. 5607
Letter No. 1166
Dated 20th July 1894
From the President, Dist. Board, South Canara

NOTE BY TECHNICAL SECTION.

Name of work Reconstructing masonry bridge over the Sooliah river in the South Canara Dt.

Amount of Estimate Rs 27,595

The estimate under review provides for constructing an arched masonry bridge of two spans of 40 feet each over the Sooliah river in the 52d mile of road No. I from Mangalore to Mercara in the South Canara Dist.

The old bridge that spanned this river is reported to have collapsed in July last year during the monsoon. This bridge is stated to have been built entirely of laterite of two spans of 38 feet each with semicircular archways & to have been damaged in a similar manner on a former occasion some 23 years back when the arches gave way entirely from abutment to abutment; new arches were then turned on the old masonry abutments & pier with the result that

5848 [illegible]

it has served its time till no for traffic purposes.

It is also stated that the existing abutments & piers are in such a delapidated condition as to be no longer serviceable in any way. It is therefore proposed to renew the bridge entirely from the foundations with granite, as per plan submitted with greater waterway as stated, by having the span of the bridge 40 feet clear instead of 38 feet & by altering the form of the arch from semicircular to an Ellipse.

The nature of sub soil at site has been tested by means of borings & found that rock has been met at an average depth of about 5 feet in the bed of the river.

The drainage area of the river down to the site of the bridge is 27 sq miles & the maximum rainfall is stated to be 13.25 inches which will give a discharge of 9620* cft per second & according to Major Ryves formula $D = C\sqrt[3]{M^2}$ taking C as 675 owing to the country composing the drainage area to be well in the hills, the result will be 6075 cft per second.

* I make 10972 cfts

Yes [illegible] 29/9

The area of the waterway of the old bridge is stated to be 1552 sq ft against 1706 sq ft as now proposed with an excess of 154 sq ft but it will be observed for calculations that the area proposed is practically the same as the old waterway viz 1580 sq ft.

rectangular portion $2 \times \frac{40 + 38.33}{2} \times 10 = 783.20$

Ellipse - do - $2 \times \frac{40 \times 25.36 \times .7854}{2}$

$= 796.71$

Total area of waterway sq ft 1579.91

Taking 6075 cft per second as the maximum discharge under the bridge, the velocity will be $\frac{6075}{1580}$ = 3.8 feet per second.

4 Cross sections of the river have been submitted, one taken at site of bridge & 3 half a mile apart upstream.

The bridge is to have a clear roadway of 18 feet & metalled to a depth of 9 inches.

The foundations are to be built of rubble in chunam & the superstructure of wadder stone in chunam except the cut waters, blocking course, coping of parapets & archwork which are to be of chiselled stone set in chunam & pointed on the exposed face with cement.

The rates are fair & data lists have been submitted for rates that cannot be checked with the schedule.

The design is submitted for the opinion & decision of the Chief Engineer owing to difference of opinion between the SE & the Dist. Board Engineer as to the area of waterway provided &c.

29.VIII.94.

DW

[illegible] orders

28/8/94

---

* No. I section mean height

16.59
16.84
16.57
15.99
15.17
14.99
13.99
5.84

$\frac{115.98}{8} = 14.49$ or say 14.50.

No. II section mean height

16.45
17.49
18.75
19.36
18.32
17.33
15.20

$\frac{122.90}{7} = 17.56$

No. III section mean height

* ~~14~~ 18.83 (* wrong. 39.91 should obviously be 35.91 [illegible])
19.30
19.59
19.71
19.69
20.10

117. ~~113~~.22

6 ~~18.88~~ 19.54

No. IV section mean height

14.52
14.74
15.84
17.14
17.20
17.10
15.24

$\frac{111.78}{7} = 15.97$

Soolia bridge

Sectional areas:

No. I Section.

L. H.

5.00 × $\frac{5.15}{2}$ ——— : 12.88

8.00 × $\frac{5.15 + 7.03}{2}$ — : 48.64

4.00 × $\frac{7.03 + 14.31}{2}$ — : 42.68

10.00 × $\frac{14.31 + 16.49}{2}$ — : 154.00

12.00 × $\frac{16.49 + 16.64}{2}$ — : 198.84

8.00 × $\frac{16.64 + 16.59}{2}$ — : 132.96

70.00 × 14.50* mean — : 1015.00

5.00 × $\frac{5.84}{2}$ ——— : 14.60

Total area sq ft 1619.60

No. II Section

4.00 × $\frac{4.27}{2}$ ——— : 8.54

20.00 × $\frac{4.27 + 5.41}{2}$ — : 96.80

6.00 × $\frac{5.41 + 16.45}{2}$ — : 65.58

60.00 × 17.56* mean — : 1,053.60

24.00 × $\frac{15.20 + 14.97}{2}$ — : 362.16

15.00 × $\frac{14.97 + 5.23}{2}$ — : 151.50

24.00 × $\frac{5.23}{2}$ ——— : 62.76

Total area sq ft 1800.94

No. III Section

10.22 × $\frac{5.65}{2}$ ——— : 28.87

20.00 × $\frac{5.65 + 16.71}{2}$ — : 223.60

5.00 × $\frac{16.17 + 14.83}{2}$ — : 78.85

50.00 × 18.88* mean — : 943.50

9.00 × $\frac{20.10 + 16.68}{2}$ — : 165.51

1.00 × $\frac{16.68 + 14.83}{2}$ — : 16.75

64.00 × $\frac{14.83 + 5.48}{2}$ — : 649.6

C.O. 2106

Brought forward. 2106·68

$25{\cdot}00 \times \frac{5{\cdot}48 + 2{\cdot}58}{2}$ ——— : 100·75

$22{\cdot}00 \times \frac{2{\cdot}58}{2}$ ——— : 28·38

Total sq ft. 2235·81

— not more than 2100 for III.
Section I. 1620
II. 1800
IV. 1450.
4 | 6970
1742

A mean area of 1700 will do – as will also a mean hydraulic depth of 11.

No. IV Section

$4{\cdot}15 \times \frac{2{\cdot}61}{2}$ ——— : 5·42

$20{\cdot}00 \times \frac{2{\cdot}61 + 4{\cdot}48}{2}$ ——— : 70·80

$24{\cdot}00 \times \frac{4{\cdot}48 + 14{\cdot}52}{2}$ ——— : 228·00

60·00 × 15·97 average ——— : 958·20

$24{\cdot}20 \times \frac{15{\cdot}24}{2}$ ——— : 184·40

Total sq ft. 1446·82

Mean sectional area

No. I Section 1619·60
II —— 1800·94
III —— 2235·81
IV —— 1446·82
7103·17
4) 1775·79 sq ft.

" wetted border:

No. I Section – 139 ft.
II —— 162 ft.
III —— 211 ft.
IV —— 138 ft.
650
4) = 162·5 ft.

average wetted border = 162·5 ft.

Mean sectional area = 1775·79 sq ft
Mean wetted border = 162·50 rft.

$H.M.D = \frac{1775{\cdot}79}{162{\cdot}50} = 10{\cdot}93$ (a)

Fall per mile = 3·84 feet.

Q = a v.
Where $v = c\sqrt{rs}$.
& a mean sectional area.

(a)

162·50) 1775·79 (10·92
16250
150790
146250
45400
32500
12900

or say 10·93

(b)

5280) 3·8400 (·000727
36960
14400
10560
38400
36960
1440

(c)

10·93
·000727
7651
2186
7651
·00794611

(d)

·00794611 | ·089141
64
169 | 1546
1521
1781 | 2511
1781
17824 | 73100
71296
178281 | 180400
178281
2119

(e)

·089141
92
178282
802269
8·200972

(f)

1775·79
8·2
355158
1420632
14561·478

r = H.M.D. = 10·93 (a)
s = fall in unity = ·000727 (b)
c = according to Bazin's table of coefficients for earthen bed & sides of HMD = 10·93 or say 11·00 is 92.

$V = 92\sqrt{10{\cdot}93 \times {\cdot}000727}$ (c)
$= 92\sqrt{{\cdot}00794611}$
$= 92 \times {\cdot}089141$ (d)
$= 8{\cdot}200972$ (e)

$Q = 1775{\cdot}79 \times 8{\cdot}2$
$= 14561{\cdot}48$ cft per second.

14.ix.0

For detail working of items (a), (b), (c), (d), (e) & (f) please see the margin.

The formula to use is not as prescribed above, but as in professional circular No. 47 dated 3rd Decr 1895

For earthwork

$V = \dfrac{1}{\sqrt{{\cdot}00008534\left(\frac{r+1}{r}\right)}}\sqrt{rs}$

where r = hydraulic

mean depth and s the
sine of the bed slope in feet per mile
which we may take at 3.5

$$\text{Then } v = \frac{1}{\sqrt{0.00008534\ \frac{12}{11}}}\sqrt{\frac{38.5}{5280}}$$

$$\therefore \log v = \tfrac{1}{2}(\log 38.5 - \log 5280) - \tfrac{1}{2}(\log 0.00008534 + \log 12 - \log 11)$$

$$= \tfrac{1}{2}(1.58546 - 3.72264 - \bar{5}.93115 - 1.07918 + 1.04139)$$

$$= 0.94694$$

$$\therefore v = 8.85$$

Taking a mean area of 1700.

discharge to be got rid of

$$= 1700 \times 8.85 = 15045$$

or say 15000 cubic feet per sec.d Calculating for the deep bed of the river only where the discharge will be effective - elsewhere it is so shallow compared with its breadth that the discharge there need not be considered

Note. These calculations were made on the supposition that the Local Fund Engineer was right. I have however since carefully considered the matter for fully an hour and a half, and now feel quite convinced that the question of discharge should not be dealt with in this way, though I am bound to state that I have oscillated considerably in my opinion. The water in the main river ponds up the affluent to within 2 feet of the crown of the arch of the proposed bridge. Should ~~the water~~ a flood in the affluent come down when the water in the main river is ponding up it will not be able to push the latter back or discharge through water which may thus be treated as practically stagnant- ~~[illegible]~~

2

as far as the discharge of the affluent is concerned, for no credit can be given to that portion of the sections which is occupied by the still ponded water. This is not the case however as regards the discharge through the bridge where we make a head. There we must give credit to the portion occupied by the ponded water, for there will be through the bridge a discharge due to that head or overfall from the upper to the lower surface. The work may - in fact should - thus be treated as a drowned weir with the floor as crest.

With the information before us it is not easy to determine the rate of discharge of the affluent when water in the main river is ponding, for it will naturally be regulated by the rise and fall of the main river. With a cross sections of the affluent some distance up and above ponding limits, and a longitudinal section to show the fall, the discharge could be calculated with sufficient accuracy. But with only rain fall and catchment area as a guide it is not possible to obtain reliable results. The safest plan seems to be to take a large coefficient and calculate the discharge of the affluent by Dickens's formula $Q = 825\,M^{\frac{3}{4}}$. The catchment area being given as 27 miles we get

$$Q = 825 \times 27^{\frac{3}{4}} = 825 \times 11.84 = 9768 \text{ or say } 10000$$

cubic feet per second.

Taking the formula for a drowned weir:—

$$Q = Lc\sqrt{2gd_1}\,(d_2 + \tfrac{2}{3}d_1)$$

L = length of weir in feet

d_1 being difference of water level above & below weir
d_2 " depth of water below weir above crest
c the coefficient in this case = 0.8 and taking d_2 at 20 limiting the head d_1 to 1 foot.

$$10000 = L \times 0.8 \times 8.02 \times 20.66 = 132.56\,L$$

$$\therefore L = \frac{10000}{132.56} = 75.5 \text{ say } 76 \text{ feet}$$

∴ Two spans of 38 feet each (clear length of overfall) would suffice theoretically — say 40 feet each — or 80 feet altogether

But as the main river ponds up to + 50.30 or within about 2 feet of the crown of the arch of Mr. Macfarlane's bridge, a reference to his design will shew that the clear length of overfall does not exceed 60 feet altogether, (neglecting diminution due to the head) items which would total to some 30 feet being obstructed by archwork. Moreover the springing of his arches is 9'.6", or so, below ponded water level, though as a rule bridges should not have more than 6" of water above their springing at H.W.L. Mr. Hannan is doubtless quite right when he says "I have no hesitation in saying that the bridge now designed would be as certainly carried away as the old one it is intended to replace" and subsequently "The District Engineer states that the old bridge collapsed because it was built with faulty material (vide para 5 of report accompanying estimate). It seems strange that a bridge which stood for 23 years (the arches were rebuilt in 1869) should suddenly collapse from this cause".

The cause of the collapse is not stated: but it occurred in the monsoon, and judging from the plan shewing the condition of the collapse the arches must have been blown out or the structure pushed over in a flood ''

The ponded water level at 50.30 may be taken as 20 feet deep. Allowing it to head up to 51.30 and allowing another foot** to facilitate the passage of floating bodies in a flood, we might have a girder bridge of two spans – each 40 feet – with the undersides of the girders at + 52.30 which is approximately the level of the crown of the arches of Mr. Macfarlane's proposed bridge. An arch bridge is not suitable. The springing would have to be quite 10 feet higher than shewn, while enormous approaches would be necessitated –

---

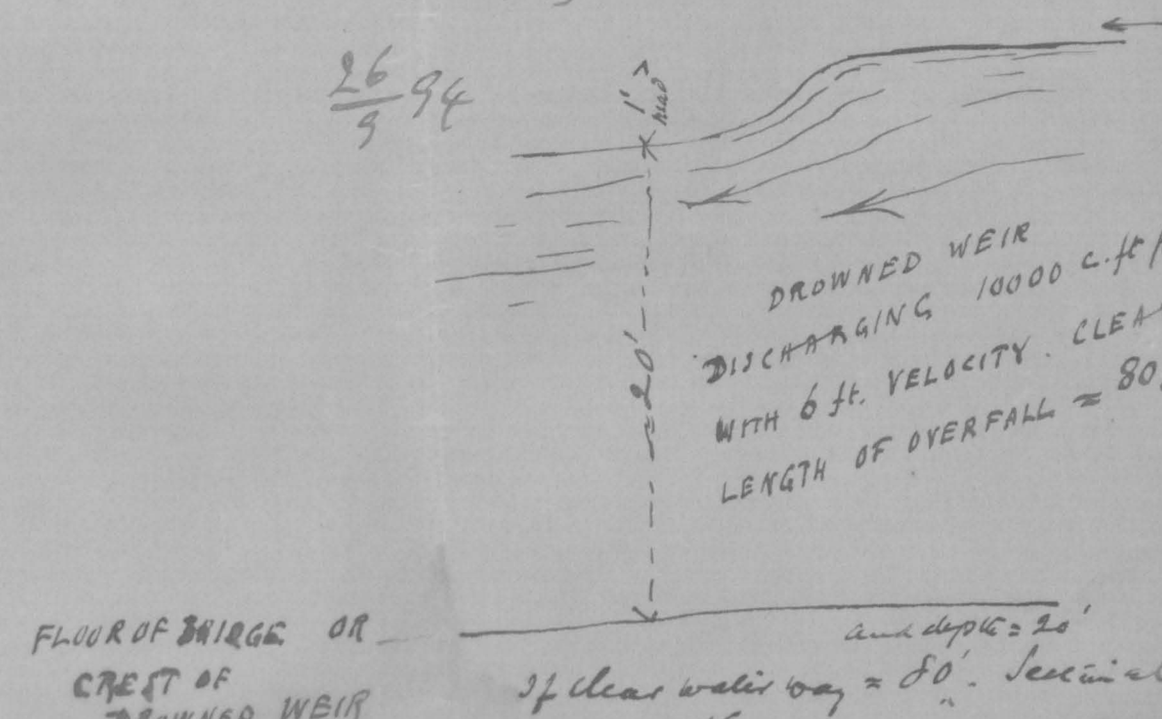
*: Query. Is this enough? If the river brings down trees with branches it will not be so. W.H.

Since the foundations are rock, footings for the pier and abutments are not necessary – and if the bed is of rock throughout no flooring is necessary. If found to be otherwise than rock throughout 2' of concrete might be put down, where the soil is other than rock, the top of the concrete to be flush with that of the rock

Cut waters on the down stream side are not required.

C W O B

26/9/94


1' head
20'
DROWNED WEIR DISCHARGING 10000 c. ft per " WITH 6 ft. VELOCITY. CLEAR LENGTH OF OVERFALL = 80 ft.
FLOOR OF BRIDGE OR CREST OF DROWNED WEIR

If clear water way = 80' and depth = 20'. Sectional area = 1600

$\therefore$ velocity = $\frac{10000}{1600}$ = 6' per sec: approximately

3804 C
28-11-94

CN° 1006

W/

C

No 3804 C d/ 28th November 1894 P. W. D.

Letter from the President Dt. Board, South Canara No 1166 d/ 20-7-94
Note by the Chief Engineer P. W. D. d/ 22nd Nov. 94 -

There seems to have been a considerable difference of opinion between the Local Fund Engineer and the Superintending Engineer IV Circle as to the mode in which the discharging capacity of the bridge should be calculated, the latter officer being of opinion that the effective area of the bridge is reduced by the heading up of the main river below, and that only the free area above the level of the water in the latter should be taken into account.

2. I must confess to an entire inability to understand on what grounds this opinion is

based; the principle has only to be carried a little further to show that a submerged sluice has no discharging capacity at all.

3. The whole area occupied by water is effective, the only result of the ponding up being to raise the water level above the bridge to the extent necessary to give the required velocity over the occupied area; the higher the water level below the bridge the higher also is that above it, but the latter does not increase at nearly the same rate as the former, and so far from the effect of the ponding up being, as the Suptg: Engineer apparently supposes, to increase the strain upon the bridge, it is ~~very much~~ to reduce very much, it the velocity necessary to pass a given quantity of water being less in proportion as the occupied area is increased.

4. The Local Dvnl Engineer has I think underestimated the discharge to be provided for, which he takes at a maximum of 6075 cubic feet per second, or 675 $M\frac{2}{3}$; discharges of over 700 $M\frac{2}{3}$ have been registered on the Palar and Poiney and in a stream such as the one under consideration, situated near the foot of the hills and subject to the heavy floods of the Southwest Monsoon, I do not think it safe to use a Coefficient of less than 900, which would

give a maximum discharge of 8100 cubic feet per second.

5. The area of water-way is stated at 1706 square feet, but it is not in reality more than 1580 up to the crown of the arches and about 1500 up to the maximum level (50.30) of the water below the bridge; it is this latter area which must be taken into account in calculating the velocity which with a discharge of 8,100 c.ft. per second would amount to 5.4 feet per second, a velocity which need cause no alarm whatever; the water level above the bridge would be about a foot higher than that

x ? 30 ~~38~~

below it, or below the crown of the arch.

6. In point of fact however the greatest strain to which the bridge could be subjected would be in the event of the stream being in flood when the main river below was not; if the "ordinary flood level" marked on the plan is that of a maximum flood in the affluent the velocity would be $\frac{8100}{560}$ or 14.45 feet per second, a velocity rather higher than I should care to allow though it would not be seriously dangerous to masonry of the quality proposed for the bridge in question.

7. There are however three points to be

noticed in this connection; 1st that the area of 560 square feet is that between the water level and the ordinary bed of the river, and that long before the velocity reached fourteen feet per second this bed would be in motion down to the underlying rock, and the true effective area would be about 900 sq feet and the velocity only nine feet per second which would be perfectly safe. Secondly, the level given is probably not that of a maximum flood, and thirdly it is exceedingly unlikely that the affluent would be in maximum flood when the main river was not in flood at all. Both these Causes tend still further to increase the effective area and to reduce the velocity.

8. I Consider therefore that the proposed design is perfectly safe, and there need be no hesitation about adopting it.

9. It has been suggested that with the water level above the bridge nearly up to the Crown of the Arches the structure might be endangered by floating trees, but it must be noted that when the water is so high as this the velocity will be very small and the trees will not strike the

bridge with sufficient force to cause danger. It is conceivable that danger might be produced during a long continued flood by an accumulation of timber above the bridge, but I consider the occurrence of any serious risk from this cause to be too remote a contingency to justify the heavy expense which would be incurred in raising the roadway to provide against it.

10. It is assumed in the above remarks (para 7) that no flooring between the piers is provided; this appears to be the case and is the correct procedure, the piers being founded on rock the bed may be allowed to scour freely down to the level of the latter. A slight saving may be made by the omission of the footings at the base of the piers and abutments, which are unnecessary if they rest on rock, and by the omission of the down stream cutwaters which are also unnecessary.

Ew
22/11

CHDS
23/11/94

DESPATCHED
28 NOV. 94

To,
The President District Board,
South Canara, with 8 enclos. noted X
E.9/16 X 6 plans & 2 estimates,

No. 1152 D d/ 3-10-94
3121 C d/ 13-10-94

Urgent

No. 3804 C d/ 28th November
1894

29/11

Extract from the Proceedings of the District Board of
South Canara, dated 15th May 1893.

Present:-

G. F. T. Power Esquire, President.

M.R.Ry. P. F. Fernandes Avargal Rau Bahadur, Treasury
Deputy Collector, South Canara,
Vice President.

R. A. Graham Esquire, Assistant Collector
of South Canara.

M.R.Ry. K. Rama Rau Avargal Rau Sahib, General
Duty Deputy Collector, South Canara.

M.R.Ry. R. Rama Rau Avargal, Acting Tahsildar of
Uppinangady.

M.R.Ry. K. N. Visvesvara Rau Avargal, Sub Assistant
Inspector of Schools, Udipi Range.

H. Altenmuller Esquire.

Haji Haroon Shet Saheb Bahadur.

M.R.Ry. M. Shiva Rau Avargal.
" S. Raghunathaya "
" U. D. Venkat Rau "
" S. Venkat Rau "
" K. P. Achutaya "
" K. Sheshagiri Pai "
" M. Kalappa Shetti "
" T. Kantappa "
" Jacki Alva "

x x x

4. Read Resolution No. 13, dated 30th January 1893, of the District Board ordering the Estimate of the Sullya granite arched bridge to lie over till tenders proposed to be invited for the work were received.

Read also Resolution No. 3, dated 24th April 1893, considering that neither of the 2 tenders received ought to be accepted.

—

The estimate amounting to Rs. 33,174 is sanctioned.

× × ×

SUPG. ENGINEER CIVIL P.W.D.
No.
2 - OCT. 93
Endt.
FOURTH CIRCLE.

(True extract).

President,
District Board.

Ph. E. 1
1006/55

South Canara District Board's office,
Mangalore, 28th January 1895.

No. $\frac{182}{D.B.}$ of 1895.

From,

W. H. Welsh, Esq.,
President District Board,
South Canara,

To,

The Superintending Engineer,
IV Circle, Coimbatore.

✱ Detailed & abstract Estimate Report and specification	1
Bridge Plan	1
Sheet of sections	1
" of catchment basin	1
" of Borings	1
Plan of old collapsed bridge	1
Data for Estimate	1
Infor mat	1
	8

Sir,

I have the honor to return herewith the plans and Estimates as per margin✱ for the Sullya Bridge received with your letter No. $\frac{84}{M}$, dated 4th March 1894. With reference to copy of the Local Fund Engineer's letter No. $\frac{132}{9\text{-}7\text{-}94}$ enclosed, the matter was referred by my predecessor to the Chief Engineer. A copy of the Chief Engineer's memorandum No. 3804C, dated 28th November last on the subject is enclosed. The Estimate now forwarded has been revised in obedience to para 10 of the Chief Engineer's Memo: with the result that it has been reduced by Rupees 395 of which Rs 160 is due to the omission of footings and down stream cut water and the balance to a clerical error that crept into the calculation for earth work which has now been corrected.

2. I request that you will be good enough to

-quests instructions as

to obtain the sanction of Government to the Estimate at an early date.

I have &ca.,
(Sd) P. Duraiswamy Aiyagar
For President
Dt. Board.

(True copy)

J. Hannan
Supg. Engineer, 4 Circle.

PW E.P.
1006/55

No. 54/W

Supg. Engineer's office, 4 Circle,
Coimbatore, 6th February 1895.
Despd. 9th - do -

From,
J. Hannan, Esq.,
Supg. Engineer, 4 Circle,

To,
The Chief Engineer,
P.W. Department.

Enclosures: ~~9~~ 10.
1 Copy of President's letter with 8 enclosures.
1 Proceedings of the Dist. Board (Original)

No. 3804C
28/11/94

Sir,

I have the honor to forward for sanction plans and Estimate amounting to Rs 27,200. for the construction of the Sullya Bridge. I also forward copy of the President's covering letter.

2. It appears from your Memo: No. 3840C of 28th November 1894 that you differ from me in considering the waterway allowed for this Bridge ample. You shew that with a head of 1 foot that the necessary discharge will take place even when the water in rear is ponded up to within 2 feet of the soffit of the arches. You observe and quite correctly that the only effect of this ponding back will be to head up the water both in front and rear to some indefinite heights above the ponded level. There is nothing to shew to what height the water will rise when the river is discharging 8100 ft per second with water ponded back as shewn. It may rise to such an extent

as to flow right over the Bridge roadway. You state that the ponding up in front will be at a much slower rate than in rear as the occupied area of discharge will be greater as the water rises. As the unoccupied area above the ponded level is only 80 square feet, it is scarcely worth consideration in dealing with a discharge of 8210 cft per second.

3. If the ponded level as shewn on the plan is anything like correct, which I don't think it is, I must adhere to my opinion regarding the insufficiency of the waterway.

4. I should be glad if you would inform me how you consider the discharging capacity of the river below the Bridge is to be calculated. It is filled with deadwater. Will not the discharge of 8100 cfs. per second have to be effected on top of this slack water, if not how is its vis inertia to be overcome. If the river is in train it is misleading to talk of a ponded water level. Your calculation of a head of 1 foot being required is based on the assumption that the river is not in train and that the discharge is from slack water to slack water, otherwise velocity of approach would be taken into consideration. Either the river is in train or it is not. If it be in train it will discharge with the velocity due to its surface fall and H.M.D, and there will be no heading up if it is not in train, then I ~~think~~ believe the water will head up over the Bridge roadway. I consider the flood levels as shewn in sections are all wrong.

No. It will discharge as a drowned weir through the slack water
CHHS
20/4/85

I have the honor to be,
Sir,
Your most obedt. servant,

Supg. Engineer, 4 Circle.

P.W. CURRENT No. 1006

I.

From
The Supg. Engineer,
4th Circle –

Encls: 10 (6 plans)
Recd: 11.2.95

Dated 6th
Despd – 9th } February 1895

No 54/W.

Enclosures 10.

Sooliah Bridge in
South Canara District –

Forwards for sanction Plans & Este amounting to Rs 27,200 for Constructing a — with his opinion regarding insufficiency of the waterway &ca.

T. Sect
[illegible]
CWM
11/2 95

W.

+ marked by [illegible]

I would ask you to consider my note of 26/9/94 in which I calculate the discharge through the bridge on the principle of a drowned weir,+ & I feel sure that that is the proper way of dealing with it. From this it will be seen that we want a clear length of overfall of at least 76 feet supposing the head to be 1 foot. But a reference to the plan will show that at +50.30 the length of water surface does not exceed 50 feet, or about 25 feet ~~to this~~ to each arch, and this will be reduced to nil or nearly so by the heading up due to the bridge. This is my reason for thinking it unsafe; particularly as the old bridge which was built on almost the same lines was carried away by a flood. And as that bridge had stood for 23 years I do not think that bad materials can have been the cause of the collapse.

C.H.B.B.
20/4 95.

+ It is not a drowned weir at all, but a submerged sluice which is quite another thing – I am satisfied that it will be safe – [illegible]

Public Works Department.

Current No. 1006
Letter No. 54/W
Dated 6th February 1895
From the Supg Engineer IV Circle

NOTE BY TECHNICAL SECTION.

Name of work Constructing Soliah bridg
in the South Canara District.

Amount of Estimate Rs 27,200

With reference to para 10 of this office memo No. 3804 C dated 28th Novr. 1894, the S E. IV Circle submits the plans & estimat for constructing the Sooliah bridg in the South Canara District du revised by the District Board Engineer with the result that a saving of Rs 395 has been affected, which is due to the omission of footings in the foundations & down stream cutwater of the pier, also to a saving in the item of earthwork, owing to incorrect calculations.

The S E in submitting the above plans & estimate stat that he adheres to his opin regarding the insufficiency the waterway provided & re quests instructions as to h

to
E

how the discharging capacity of the river below the bridge is to be calculated.

The estimate alone has been revised & not the plan of the bridge, consequently the items cannot be examined in detail.

The plans & estimate have been countersigned by the President Dist Board.

1. IV. 95.

1028 W

~~No. 1028 W. dated 1st May 1895~~

PROCEEDINGS OF THE MADRAS GOVERNMENT.

READ the following

Letter from the President Dt Bd, S. Canara (H.E. No. 1166 d/20 July 1894)
Do ——— do ——— (" " 1980 d/23d Octr ")
Do ——— do ——— (" " 2054 d/31st Octr ")
Do ——— do ——— (" " 2076 d/8 Novr ")
Do ——— do ——— (" " 2136 d/15th Novr ")
Do ——— do ——— (" " 2188 d/21st Novr ")
Do ——— S.E. IV Circle (" " 54 W d/6 Feby 1895)

80

Note by the Chief Engineer P. W. Department:—

The Chief Engineer has considered the subject very carefully, and is ~~quite~~ satisfied that the proposed bridge is quite safe.

EW

Ootacamund
April 1895

(40—4,000—14-3-95.)

24. IV.

23/4 95

Order

No 1028 W - d/ 1st May 1895.

28. 11. 94 No- 3804 C
13. 10. 94 - 3121 C
3. 10. 94 - 1852 D

Order:—

B. M.
Civil works

9 P

Estimate for the construction of the Sullya bridge - S. Canara district

The estimate amounting to Rs 27,200 for the construction of the Sullya bridge in the South Canara district is sanctioned.

W
27 Apr.

2. This sanction has been registered as Local No 2 W of 1895-96 and classified as Communications, Original Works.

I/ B

DESPATCHED
10 MAY 95

27/4/95

CHMS
27/4 95

CGI
24. IV.

S.E. IV Circle with enclosures (8
The L. & M. dept

(The Honorable
The Chief Secretary for favor
of counterinitials)

15/ 12/5/95

10

1006

Govt. of 1895 Madras.

PUBLIC WORKS.

2/5/95

Dated

Recd. Encl.

G.O., 1st May 1895, No. 1028W.

Sullya bridge.

Estimate amounting Rs. 27,200 for the construction of the in the South Canara istrict, sanctioned.

1-10

80/4

INDEXED.

20. 2/5