Public Works (1898) Department.

G.O., No. 6616

Dated 11.3.98

13/3/98

[Despatch Abstract.]

Girder bridge: Estimate of Rs. 9460 for constructing a ——— with the 65 ft. mile of Road No 2 from Madura to Ramnad, Sanctioned with Remark

1500/3 Jic

9.11.3.98

[P. W. 86.
1,000—12-2-98.]

Indexed.

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.
4251C 19.11.96 2791C 9.697							

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

BUILDINGS AND ROADS.
CIVIL WORKS.

Government {1898} of Madras.

PUBLIC WORKS.

Recd. }
Regd. } 1898.

Enclosures

Spare copies

G.O., No. 661 W., 11th March 1898.

MARCH.

Girder Bridge

Estimate of Rs. 9,460 for constructing a — in the 65th mile of road No. 2 from Madura to Ramnad, sanctioned with remark.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following papers:—

From the Superintending Engineer, VI Circle, dated 1st June 1896, No. 594/M.D.
" " " VI " " 23rd Aug. " " 1057/M.D.
" President, District Board, Madura, dated 2nd Nov. " " 356/D.B.
" Superintending Engineer, VI Circle, dated 31st Mar. 1897, " 486/M.D.
" " " " 21st Aug. " No. 356.
" Superintending Engineer, VI Circle, dated 23rd Sept. 1897, No. 1355 M.D.

From Lieutenant-Colonel O. V. BODDY, R.E., Superintending Engineer, VI Circle, to the Chief Engineer, Public Works Department, dated Trichinopoly, 23rd September 1897, No. 1354 M.D.

In reference to your memo., No. 2807 C., dated 9th June 1897, returning for revision the plans and estimate connected with the construction of a girder bridge in the 65th mile on road No. 2, Madura to Ramnad, I have the honour to resubmit the plans and estimate which are duly verified and revised by the District Board Engineer, Madura, as per your notes in the memorandum under reference.

2. The District Board Engineer has now submitted a full working of the hydraulic calculations, and it will be seen therefrom that he calculates the velocity of the stream to be 5·26 feet per 1″ and the velocity through bridge $7\frac{1}{2}$ feet which gives a full discharge of 7,500 cubic feet per second, while the total discharge through the surplus sluice in the tank and the two breaches, 44′ × 4′ each, shows 5,788 cubic feet per 1″; the proposed waterway of the bridge, viz., 125 feet, is proved to be ample, and it is in fact more than double the old waterway which was only 60 feet.

3. The District Board Engineer states that good vitrified bricks will be selected for foundation. Cutstone cutwaters are now provided as ordered, and data submitted for the rates pointed out in your memorandum to be high.

4. In reference to paragraph 2 of the memorandum the assurance required is conveyed in the District Board Engineer's letter, No. 353, dated 9th August 1897.

5. The plans and estimate have been countersigned by the President, District Board, and the Proceedings of the District Board sanctioning the estimate is also forwarded. The estimate which now amounts to Rs. 9,520, is recommended for sanction.

ENCLOSURE.

PROCEEDINGS of the District Board, Madura, dated 16th August 1897, No. 83.

Read—

16. Letter from the District Board Engineer, Madura, No. 353, dated 9th August 1897, forwarding, for sanction and transmission to the Superintending Engineer, a plan and revised estimate, the latter for Rs. 9,520 in lieu of the original estimate for Rs. 9,200 for the construction of a girder bridge in the 65th mile of road No. 2, Madura to Ramnad.

Resolution—Sanctioned.

Note by the Chief Engineer, Public Works Department.

The undersigned has the honour to observe that the waterway provided has been based on the assumption that the floor level of the bridge is at + 14·00 which is a little lower than the present bed of the river at the proposed site of the bridge, but in the plan of the bridge the floor level is at + 9·00, or 5 feet below the river bed level. This is obviously a mistake. The floor level has, therefore, been brought up to + 14 and the estimate reduced from Rs. 9,520 to Rs. 9,460.

(Signed) W. B. DEWINTON,
4th March 1898. Ag. Chief Engineer.

ORDER—No. 661 W., dated 11th March 1898.

The estimate amounting to Rs. 9,460, as altered by the Chief Engineer, for constructing a girder bridge in the 65th mile of road No. 2 from Madura to Ramnad in the Madura district, is sanctioned.

2. Attention is drawn to the Chief Engineer's note recorded above.

3. This sanction has been registered as Local No. 17 W. of 1897-98.

(True Extract.)

Under Secretary to Government.

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

Exd. T. K. Narayana Aiyangar.

P.W. DEPARTMENT.

Papers to be read in Proceedings:—

RECEIVED TO GOVT. PUBLIC WORKS

Again G.O., dated 189 , No.

Again G.O., dated 189 , No.

Current No. 5031 of 1896, dated 1st June 1896, from the S.E. VI circle

" " 7714 " 1896, " 23rd August 1896, " —— do ——

" " 10009 " 1896, " 2nd November 1896, " the President D.B. Board Madura

" " 3410 " 1897, " 31st March 1897, " the S.E. VI circle.

" " 8453 " 1897, " 21st August 1897, " the President D.B. Board, Madura

" " 9596, " 1897, " 23rd September 1897, " the S.E. VI circle.

" " 9661, " 1897, " 23rd " do " Note by the Chief Engineer dt 4.3.98

Print with enclosure

ORDER.

No 661 & 11.3.98

The estimate amounting to Rs 9,460, as altered by the Chief Engineer, for constructing a girder bridge in the 65th mile of road No 2 from Madura to Ramnad in the Madura District, is sanctioned

2. Attention is drawn to the Chief Engineer's note recorded above.

3. This sanction has been registered as Local No 17 4 of 1897-98.

To the Secretary to Govt Local and Municipal Dept for favour of communication.

Note for the Secretary

No objection on the part of this Department

9.3.98

To the S.E. VI circle

" L & M Dept with enclosure

Note

Draft

Cir

Sroom 2.3.98

4.3.98

5.3.98

This estimate has been dealt with in the accompanying techni

[P. W. 1. 500—27-1-98.]

notes.

With reference to His Excellency's remark dated 24th May 1897 on the draft order flagged G, it is submitted that the District Board Engineer, Madura, states that he has "no hesitation in giving a guarantee that the water way is ample." vide para 11 of his letter No 353 dy 9th August 1897 (flagged B)

The waterway unwatched is said to be more than double the waterway of the old bridge & I consider it sufficient

Maj Scrm 2.3.98

W 4.3.98

at 4/3/98.
-3-98.

No

Note by the Chief Engineer

The undersigned has the honour to observe that the waterway provided has been based on the assumption that the floor level of the bridge is at +14·00 which is a little lower than the present bed of the river at the proposed site of the bridge but in the plan of the bridge the floor level is at +9·00 or 5 feet below the river bed level which is obviously a mistake. The floor level has, therefore, been brought up to +14 and the estimate reduced from Rs 95 20 to Rs 94 60

Maj Scrm 2.3.98

4.3.98

No.

Government of Madras.

DEPARTMENT.

MEMORANDUM.

Dated Madras, 189 .

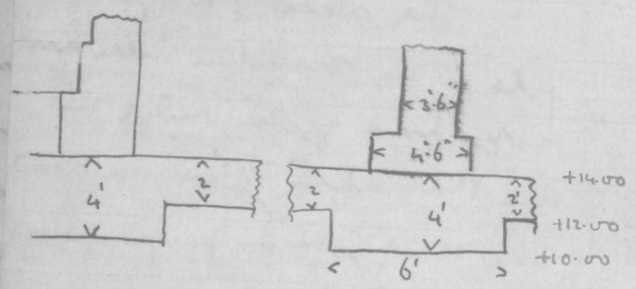
W- for orders

The accompanying file is in connection with an est. for a girder bridge on the Ramnad- Madura Road. The est. has been prepared by the L.F. Engr. Has been under scrutiny by this Office more than once. The question of waterway the provided has been under discussion the file has now been re-submitted with the information asked for by this Office -

A serious mistake in the design of the bridge has up till now been overlooked. The waterway provided has been based on the assumption that the flow level of the bridge is at +14.00 which is a little lower than the present bed of

[P. W. 41. 1,000—14-10-97.]

river on the proposed site of the bridge, but in the plan of the bridge the floor level is at +9.00 or 5 ft below river bed level - This is obviously a mistake. The floor between piers should be at +14.00 ft is now proposed to have the founds of the bridge as foll -



The plan shows "hard earth" at +12.00

Permission is requested to revise the soil round the plan accordingly

Sd/ [illegible]
16/2/98

T. revise accordingly

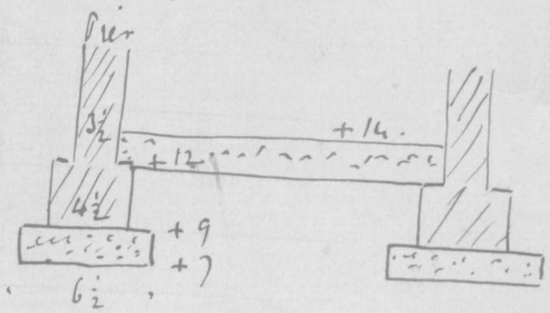
Sd/ [illegible]
24.2.98

Dy The plan & estimate have been revised accordingly and the amount of estimate reduced from Rs 9520 to Rs 9460. Rs 25.2.98.

N. can now be passed.

Sd/ [illegible]
26.2.98

Before these the foundn of piers & abutments as they are, as there may be scour. Levels of the bed are + 14



Sd/ [illegible]
21.2.98

Public W

40847

Current No. 9.0.w.0.m 17.5.7

Letter No 1354 M.D. ER,

Dated 23rd September 1897

From the Supt. Engr. II Circle

NOTE BY TECHNICAL SECTION.

Name of work Constructing a Girder Bridge in the 65th mile on road No 2 Madura to Ramnad

Amount of Estimate Rs 9460

The Supt. Engineer II Circle, pe. submits with his letter dated 23rd September 1897 plan & Estimate for constructing a Girder Bridge in accordance with instructions contained in Chief Engineer's Memorandum No 2807c dated 9/6/97.

Hydraulic details. Longitudinal and cross sections of the stream have been furnished - vide plan No 3. The calculations of discharges submitted by the E. E. Engineer has been checked & found correct - vide -

59.562 = [illegible]

[P. W. 60
250—23-4-97.]

d at from
river direction only
that in length, is hardly
necessary.

- discharge of stream
worked out by Sections given
4,087 Cub Ft. per second-
ide calculation sheet and
Weir in Sauk 3,324
Cub Ft. per second - The
discharge through the 2 breaches
cut by Villagers in the Sauk
Bund need not now be
considered as the L. I. Engineer
in his letter No. P.C. 353 dated
9th August 1897 - para 12,
Wants. that the Kyots do
not now make breaches
at the Old places marked
A+A+ on Survey Plan No 2,
but 2½ miles higher up
on the Divisional side
of the Sauk; so no water
enters the stream pro-
posed to be bridged.
Taking therefore 4,087
Cub Ft. per second to
be discharged through
the bridge, and allowing
the afflux or increased
water level above bridge
to be 0.50, and 0.80 as
value of c for bridges
Irrigation Manual page 69 /

W. Commissioner's Branch. 5.1.98.

SRSmith
26.2.98

will be:-

$$= \frac{4087}{\cdot 80\sqrt{64.4 \times \cdot 50}\left(7.5 + \frac{2 \times 5}{3}\right)}$$

$$= \frac{4087}{\cdot 8 \times 8 \times \cdot 706 \times 7.83}$$

$$= \frac{4087}{35.52} = 115 \text{ feet}$$

The waterway allowed is
is 5 Vents of 25 feet Span
= 125 feet which is more
than enough.

The discharge through the
bridge treating it as a
drowned Weir with afflux
·50 would be:-

$$D = 6 \cdot c\sqrt{2g}d\left(dd + \frac{2d}{3}\right)$$

$$= 1 \times 0.8 \times 8\sqrt{\cdot 50}\left(7.5 + \frac{2 \times 5}{3}\right)$$

$$= 6.4 \times \cdot 707 \times 7.83$$

$$= 35.43 \text{ Cub Ft. a second for 1 foot in length.}$$

$\therefore 125 \times 35.43 = 4429$ Cub Ft. a second.

The velocity due to this head
and increased discharge
would be +7.36 feet nearly. *
The floor of bridge is made
up of concrete in mortar
2 feet thick. Soil - White sand.
The proposed waterway is
stated by the L. I. Engr to
be more than double the
Old waterway which was
only 60 feet. In para 4
of his letter quoted above the
L. I. Engineer gives a guar-
antee that the waterway is
ample.

Construction. Materials.

Good vitrified bricks brick

* vide calculation sheet.

+ This is very high

21.2.98

32 + 27.5625 = 1.1V,
59.5625 = 1.1V,²

…vice now provided for
…Waters according to
…gation made by the
…of Engineers.
…ates. Data, in detail, has
…en furnished for Sankey
…oncrete in Chimney - Cut-
…tone - and Brick in Chimney
…hich also fair.
…he Bridge plan has been
…lipped by the President
…District Board, also the
…Estimate.

H.C.H.
11/Nov/98

Irrigation

26.258

7.0 × 1.26 = 8.
12 × 4.37 = 5:
72 × 6.42 = 402
24 × 6.34 = 152
5 × 5.63 = 28.
7 × 4.16 = 29.1
9 × 1.53 = 13.77
827.48

C.S. at ruined Bridge.

30 × 3.18 = 95.40
30 × 9.36 = 230.80
24 × 9.36 = 224.64
18 × 5.77 = 103.86
14 × 0.50 = 7.00
711.60 say 71:

A = 770 (average) - Under = 200

$\frac{A}{B}$ = 3.8 = R. f = 4.4 per mile

$V = .9\sqrt{27\frac{A}{46}}$

$= .9\sqrt{8.8 \times 3.8}$

= 5.13 ft. per second.

A × V = 3950.20 Cub ft. per second

L.J. Wood. Engineer gets 4086 — " —

Discharge of Sluice Weir of 9 Vents of 4' × 7' each and head of water 10½ ft. above sill.

$D = 5A\sqrt{H}$

$= 5 \times 36 \times 7\sqrt{7}$ ⅔(10½) =

= 3324 C. ft. per second

To find velocity through Bridge with an afflux of ½ a foot.

The rise = $\frac{1}{2g}\left(c \cdot V_1^2 - V^2\right)$ c = 1.1

$\frac{1}{2} = \frac{1}{64}\left(1.1V_1^2 - V^2\right)$

where V = 5.25 ft. a second

$\therefore \frac{1}{2} = \frac{1}{64}\left(1.1V_1^2 - 5.25^2\right)$

Multiplying both sides by 64

$\therefore 32 = 1.1V_1^2 - 15.251^2$

Adding $(5.26)^2$ to both sides of the Eqn

$32 + (5.25)^2 = 1.1V_1^2$

$32 + 27.5625 = 1.1V_1^2$

$59.5625 = 1.1V_1^2$

river now provided for

Waters 595.625
1.9 cats 11
= 54.148 mark
of
= 7.36 feet mark

rates

H.L.U.
11.2.98

Public Works (1897) Department.

CURRENT No. 9661

Order

From The Superintending Engineer
N. Circle

No. 1357 E.D.

Dated 23rd September 97
Received 29-9-97
Enclosures 10 (3 plans)
Spare copies

SUBJECT.

Girder Bridge in the 65th mile on Road No. 2 Madura to Ramnad — Submits with remarks a revised Estimate for Rs 9520 for the Construction of the —

BA[illegible]PERS.

No.	Date.

FURTHER PAPERS.

No.	Date.

[illegible]NG ENG[illegible]ER, [illegible]ER,

Proceedings of the District Board, Madura.

Dated 16th August 1897.

PROCEEDINGS No. 83 OF 1897.

Read :—

16. Letter from the District Board Engineer, Madura No. 353 dated 9th August 1897 forwarding for sanction and transmission to the Superintending Engineer a plan and revised estimate, the latter for Rs 9,520 in lieu of the original estimate for Rs. 9,200 for the construction of a girder bridge in the 65th mile of road No. 2 Madura to Ramnad.

Resolution :— Sanctioned.

(True extract)

Chairman

Secretary

BA[illegible]ERS. FURTHER PAPERS.

No.	

SUPG. ENGINEER'S OFFICE
No. [illegible]
23 AUG. 1897
P.W.D.
SIXTH CIRCLE.

Ouss.
2661/97

Proceedings of the District Board

1354. 2nd.
Encls Nos 6 to S.E. 6th No. 23-9-97

No. 1354. 2nd. OFFICE OF THE SUPERINTENDING ENGINEER,
6TH CIRCLE,

Trichinopoly, 23rd Sept. 1897.

From Lt-Col. O. V. Boddy R.E.
The Sperintending Engineer,
6th Circle.

To

The Chief Engineer,

SIR,

P. W. D.

7 ENCLOSURES.

In reference to your Memorandum No: 2807 C dated 9 June 1897, returning for revision the plans and estimate connected with the construction of a Girder Bridge in the 65 3/4 mile on Road No: 2, Madura to Ramnad, I have the honor to resubmit the plans and estimate which are duly verified and revised by the District Board Engineer, Madura, as per your notes in the Memorandum under reference.

2. The District Board Engineer has now submitted a full working of the hydraulic calculations and it will be seen therefrom that he calculates the velocity of the stream to be 5.26 feet per 1" and the velocity through

200—20-4-96

No

...dge 7½ ft. which gives a full discharge of ...00 cft. per second, while the total discharge ...rough the surplus sluice in the tank and ...e two breaches, 44'×4' each, shows 5788 cft. ...er 1"; the proposed waterway of the bridge, ...iz. 125 ft. is proved to be ample and it is ...in fact more than double the old water-...way which was only 60 feet.

3. The District Board Engineer states that good vitrified bricks will be selected for foundation. Cuttaka cutwaters are now provided as ordered, and data submitted for the rates pointed out in your Memorandum to be high.

4. In reference to para 2 of the Memorandum the assurance required is conveyed in the District Board Engineers letter No: 353 dated 9 August 1897.

5. The Plans and Estimate have been countersigned by the President, District Board and the Proceedings of the District Board sanctioning the estimate is also forwarded. The estimate which now amounts to Rs. 9,520 is recommended for sanction.

...

...ER,

I have the honour to be
Sir.
Your Most obedient Servant.

V. V. Brodhurst Lt-Col. R.E.
Supdg Engineer, 1st Circle

7 Enclosures: -
1. Plan
1. Estimate with report, hydraulic calculations &c.
1. Site Survey
1. Sheet of cross sections
1. Data.
1. Proceedings of the Dt. Board No: 837/16-8-97
1. Dt. Bd. Engrs letter No: 353 dt 9-8-97.

BA[illegible]ERS. FURTHER PAPERS.

P. W. D. 6th CIRCLE.

FROM

THE SUPERINTENDING ENGINEER,

6TH CIRCLE.

TO

THE CHIEF ENGINEER,

NO.

Dated.
Received. } 189

Enclosure.

Public Works (1897) Department.

ER,

CURRENT No. 9596

Order

From
The Supg Engineer
VI. Circle

No. 1355. D.

Dated 23rd September 1897
Received [illegible]
Enclosures —do—
Spare copies

SUBJECT.

Girder Bridge on Road No. 2. Madura to Ramnad — Reports that there was undue delay in submitting the estimate for the — taking into Consideration certain Circumstances.

F P[illegible] D. 6th CIRCLE

BACK PAPERS.

No.	Date.

FURTHER PAPERS.

FURTHER PAPERS.

No.	Date.

No. 1355.2.D.

OFFICE OF THE SUPERINTENDING ENGINEER,
6TH CIRCLE,

Trichinopoly, 23rd September 1897.

From Lt.-Col. A. T. Boddy, R.E.
The Sperintending Engineer,
6th Circle.

To

The Chief Engineer,

SIR,

I have the honour to be,
Sir,
Your most obedient servant,
A. T. Boddy
Lt.-Col. R.E.
Sperintending Engineer,
6th Circle.

ENCLOSURES.

With reference to the remarks made by the Madura District Board Engineer in his letter No: 353 dated 9 August 1897, addressed to the President, Dt. Board, Madura, and which was forwarded to you as an enclosure with this office letter No: 1354. Dt. dated 23rd September 1897, I have the honour to inform you that the estimate for a girder bridge across the surplus channel from Ramnad tank was, after scrutiny in this office, forwarded to you with this office No: 594 Dt. dated 1st June 1896 and that it was returned to me with your Memo No: 3577C dated 17 October 1896 and forwarded by me to the President, District Board, with this office letter No: 1379 Dt. dated 5 November 1896.

200—20-4-98

TERS.

- tributaries.

The revised estimate was received back from the President, Dk. Board, with his letter No: 356 D/ 22 January 1897, & after scrutiny in this office was forwarded to you with this office letter No: 486 Irs. D/ 31 March 1897 and it was received back again with your Memo No: 2807 CD/ 9 June 1897. I kept the paper with me a little time then as I wished to go into the question of the discharges alluded to in the above Memorandum myself, and I returned the estimate to the President, Dk. Board, with my Endorsement No: 974 Irs. D/ 10 July 1897. The estimate has now been received back from the President, Dk. Board, with his letter No: 356 D.B. D/ 21 August 1897 and after scrutiny forwarded to you with this office letter No: 1354. R.D. D/ 28th September 1897.

Cu 7661

I do not think that there has been any undue delay in passing the estimate through my office. It had to wait its turn, and my draftsmen have had very heavy work this year more especially with reference to the estimates for the Periyar dis-

- tributaries

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

O. F. Bradley Lt Col. R.E.
Supg Engineer, 11 Circle

2/8.97

FURTHER PAPERS.

P. W. D. 6th CIRCLE.

BAC[illegible]

[illegible]ERS.

No. FROM

THE SUPERINTENDING ENGINEER,

6TH CIRCLE.

TO

THE CHIEF ENGINEER,

NO.

Dated.

Received. } 189 .

Enclosure.

Public Wo[illegible] (1897) Department.

CURRENT No. 8453

From

The President.

District Boards, Madura.

No. 356

Order

await return of
the plan & estimate & things
I.G. - If not received soon,
remind & urge sent.

Cr
26/8/97

Dated 24.8.97

Received 24.8.97

Enclosures .

Spare copies .

SUBJECT.

Bridge in the 65th Mile of road
No: 2 Madura to Ramnad.
Communicating copy of his
letter to the Supdg: Engineer
VI circle forwarding plan
and estimate for construction
of a ——.

Reminder issued on 13.9.97

27/9/97

[P. W. 29. 1,000—22-4-97.]

VH
2/8.97

FURTHER PAPERS.

No.	Date.	No	Date.

...ks (189

Copy of Communication No. Rc 356 dated 21st August from the President, District Board, Madura to the Superintending Engineer 6th Circle Trichinopoly.

With reference to your No. 974 Br. D 10-7-97, I have the honor to forward herewith the estimate and plan for construction of a bridge in the 65th mile of road No 2 Madura to Ramnad revised as per suggestions of the Chief Engineer. A copy of the District Board Engineer's letter No. 353 9-8-97 giving cost of the above estimate is also enclosed. The revised plan and estimate were passed by the District Board in its Resolution No 83 of 16th August 1897 put up. I request that they may be sent us very early after scrutiny by the Chief Engineer.

Rc 356 of 1896-97 (True copy)

Communicated to the Chief Engineer by the Government of Madras Public Works Department in reference to his No. 974 Br. D of 10th June 1897.

Madura District Board Office
21st August 1897

S Es Ws.

Chairman
For President.

21.8.97

FURTHER PAPE

No.

Public Works (1897) Department.

No. 2791C, d 9th June 1897.

CURRENT No. 4869

To

The President D.t Board
The President, District Board,
Madura
Madura

Order

Sir,

In reply to your letter
In reply to your letter
R.C. No. 356 dated 15th May 1897
R.C No. 356 dated 15th May 1897
I have the honour to inform
I have the honour to inform
you that the revised estimat
you that the revised esti=
for the construction
=mate for the construction
of a bridge on the 65th mile
of Bridge on the 65th mile
of Road No. 2 Madura to
of Road No. 2 Madura to
Ramnad - has been returned
Ramnad - has been re=
to the Supdg
=turned to the Supdg
Engineer, VI circle, for
Engineer, VI circle, for
further revision.
further revision.

I have &c.

From The President of the
Dt: Board, Madura

R.C. No. 356/97

Dated 15.5.97

Received 17.5.97

Enclosures

Spare copies

SUBJECT.

Bridge in the 65 mile of
Road No: 2 - Madura to Ramnad
Requesting sanction to the
construction of a ——

Copy
D.P.W.
3.6.97 d 10/6/97

Rur.

T. A. 7/6/97

[F. W. 26. 3,000—16-11-96.]

V.L.S. 134
R 9/6

11/6/97

BACK PAPERS.

No.	Date.

FURTHER PAPERS.

No.	Date.

L. F. DEPARTMENT.

MADURA DISTRICT BOARD OFFICE.

15th May 1897.

R. C. No. 356 of 1897

From, J. Twigg Esqr.
President of the District Board,
MADURA.

To, The Chief Engineer,
Public Works Department,
Madras.

Sir, I have the honor to state that plans and revised estimate for the construction of a bridge in the 65th mile of Road No 2 - Madura to Ramnad, prepared in the Office of the remarks contained in your Memo No 3597 17-10-96 and forwarded to the Superintending Engineer on 22nd January 1897 for scrutiny and transmission to Govt through you for approval, have not yet been received back, and as it is desired that the same may be sanctioned and returned to me at an early date.

I have the honor to be
Sir
Your most obedt servt
J. Twigg
for Executive Engr.

Enclosures.

* Sent to Arrows/s vide Memo 3410.

15.5.97

O.C.S.

R4/6 5/6 R9/6

Public Works (1897) Department.

CURRENT No. 3410

Order

From

The Exec Engineer
Trichy

No. 486 Rds.

Dated 31 March 1897
Received 3-4-97
Enclosures 5 × 6 (2 plans)
Spare copies

SUBJECT.

Bridge in the 65th Mile of Road No: 2 — Madura to Ramnad — Submitting for sanction a fresh estimate of Rs 9230 for Constructing a ——

I/ Asst Secretary
Copy sent 13/4
W

O.L.S. 83 sent again
R4/6 5/6. R9/6

W.

LOCAL FUND DEPARTMENT.

189 .

From,

The President of the District Board, Madura.

To,

The

Dated
Received

No.
Enclosure.

Subject.

Enclo No. 0 to Doc. 2

BACK PAPERS.

G.O.	No.	Department.	Date.
	4251 C	PW	19-11-96
	3597 C	PW.	17-10-96

G.O 3410 4869

From the SE VI circle

Bridge on the 65th mile of Road No 2 Madura to Ramnad; submtg an estimate for consdg &—

The above sent to DW on 6-5-97.

AS

How the file came back from Govt?

CE
15.5.97

SAW

CN: 3410 has not yet returned from Govt.

AE
20/5/97

XE Please submit this reminder to Govt.

CE
21/5/97

OFFICE OF THE SUPERINTENDING ENGINEER,
6TH CIRCLE,

No. 486 Md.

Trichinopoly, 31 March 1897.

From Lt-Col. C. T. Boddy R.E.
~~The~~ Superintending Engineer,
6th Circle.

To

The Chief Engineer,

SIR,

P. W. D.

ENCLOSURES. 5.
1. Estimate
1. Bridge Plans (Tracing)
1. Site Survey — Do.
1. Sheet of Hydraulic Calculations
1. Copy of D.E. Md's Proceedings
5

I have the honor to forward for sanction a fresh estimate amounting to Rs 9,230 together with plans prepared by the District Board Engineer, Madura, in connection with the construction of a Bridge in the 65th mile of Road No. 2 — Madura to Ramnad.

2. In revising the design of the bridge the District Board Engineer has given effect to the alterations suggested by you in Memorandum No: 3597 C dt/17 October 96 returning the 1st estimate of Rs 9,000 for the work submitted with this office No: 594 Md. dt/1 June 1896, with the exception that he retains vitrified bricks for Concrete, since stone can

BACK PAPERS.

G.O.	No.	Department.	
	4251	C W	
	3597	C W.	

obtained except at great cost.
A statement showing hydraulic
calculations accompanies the estimate.
The bridge allows an ample waterway
and the design now submitted meets
all requirements.
4. The Board's Proceedings No: 215
dated 18 January 1897, sanctioning
the fresh estimate of £9,200 is here-
with forwarded. The figure 9200 has
been raised in this office to £9,230
owing to certain errors in the detailed
measurements having been rectified.
I have the honor to be
Sir,
Your most obedt. Servant,
C. P. Brodhurst Lt.Col. R.E.
Supg Engineer, 11 Circle

P. W. D. 6th CIRCLE.

FROM

THE SUPERINTENDING ENGINEER,

6TH CIRCLE.

TO

THE CHIEF ENGINEER,

NO.

Dated.

Received. } 189 .

Enclosure.

No. 2807 C, dd 9-6-97

P. W. D.

Memorandum

Letter from the Supdg. Engineer, VI Circle, No. 486 M. D. dated 31st March 1897

The estimate for constructing a girder bridge across a surplus channel from Ramnad tank at the 65th mile of Road No 2. Madura to Ramnad, received with the letter read above, is returned to the Supdg. Engineer for revision with reference to the following remarks: —

1 Reminder issued 4.8.97
2- " 13.9.97

T. 16/9/97.

16/9/97

(1) There is no longitudinal section to show the fall of the stream, but presuming it to be 4·4 feet per mile, as stated by the District Board Engineer, and taking the section of the channel at the bridge according to scale, a discharge of 3138 cubic feet per second is obtained, and that the bridge will be capable of sustaining, for the velocity would not exceed 5¼ feet per second. But the weir discharge

harge would probably give
P. more accurate result, and if,
is apparently the case, the
-called weir is a surplus sluice
TP
of 9 vents each 4'×7', the latter
dimension being the length mea-
-surement, with an effective
head of 8½ feet, the discharge
becomes 3634 cubic feet per second
and the velocity through the bridge
6 feet which is also allowable. But
it is not considered desirable
that the bridge should be sub-
-jected to any additional surplus.
It is, however, stated that the
work provides also for a dis-
-charge of 2464 cubic feet through
two breaches; but the only
breach shown in the plan is that
of the road itself in its un-di-
-verted portion, which in no
way affects the question. The
bridge provides sufficient
waterway for the discharge through
the surplus sluice, but no more.
Considering that the last bridge
is

No 2807 C, 17 9 97 C No. 3410.

Dir.

Pleare see HE's remarks.

For orders whether the estimate may be returned for revision with reference to the remarks in the Note by the Chief Engineer.

A reminder has been received from the President, District Board, Madura, about this estimate. Please see C No. 4869.

RSR
25/5/97.

10. Perhaps the estimate might be returned for revision with reference to paras 1 & 6 of the Note - or, rather, para 7 might be struck out & the Estimate revised with reference to the Note thus modified.

CWRS
25/5/97.

yes
26/5/97

stated to have been washed away for want of sufficient water-way, a wider limit is expedient in the case of this bridge.

(2) Vitrified bricks - carefully selected - may be used for foun-dations.

(3) No reason is assigned for not providing cut-stone for the cutwaters according to the sugges-tion made in para. 4 of Memo No. 3597 C dated 17th Octr. 1896.

(4) The following rates are in excess of the schedule.

(a) concrete Rs 15 instead of Rs 10

(b) Burnt brick in chunam Rs 20 instead of Rs 18.

(c) Cutstone in chunam Rs 1-6 and Rs 1-8 against Re 1 in the schedule.

These enhanced rates seem reasonable, but data in their support should have been submitted.

(5) The estimate shows a mistake of 30 cubic feet of teakwood on the wrong side. This entails

...ils an increase in the ...imate of Rs 90 raising it from Rs 9230 to Rs 9320.

(b) The Bridge plan should be signed by the President of the District Board.

2. The estimate when resubmitted should be accompanied by an assurance from the District Board Engineer, Madura, that the waterway proposed is sufficient.

Chief
D. E. Bd.
1.97
6.

To
The Supdg. Engineer, VI circle
with 6 enclosures.

Returned to Hd Draftsman for reference. Pur 28/5/97

No. 2807 dy 9-6-97
Note by the Chief Engr. P.W.D.

There is no longitudinal section to show the fall of the stream, but presuming it to be 4'4 feet per mile, as stated by the District Board Engineer, and taking the section of the channel at the bridge according to scale, we get a discharge of 3138 cubic feet per second, after the bridge will be capable of sustaining, for the velocity not to exceed 6½ feet per second. But the weir discharge would probably give a more accurate result: and if, as apparently the case, the so-called weir is a Surplus Sluice of 9 vents each 4'×7', the latter dimension being the length measurement, with an effective head of 8½ feet, the discharge becomes 3634 cubic feet per second and the velocity through the bridge 6 feet which is also allowable. But it is not considered desirable that the bridge should be subjected to any additional surplus. It is, however, stated that the work provides also for a discharge of 4464 cubic feet through ten breaches: but the only breach shown in the plan is that of the road itself in its undivided

...tion, which in no way affects
...ails of Execution. The undersigned
...mate considers that the bridge provides
sufficient waterway for the
discharge through the
...ue to Hume, but no more.

2. Vitrified bricks - carefully
selected - may be used for
foundations.

3. No reason is assigned
for not providing culverts for the
cut-waters according to the
suggestion made in para 4
of Memo No 3597e of 17th
Dec. 1896.

4. The following rates are in
(a) Excess of the schedule:-
Concrete R 15 instead of Rs 10.
(b) Burnt brick
in chunam " 20 " " " 16
(c) Cut-stone in
chunam R 1-6 and R 1-8 against R 1
in the schedule.
These balanced rates seem
reasonable, but data in their
support should have been
submitted.

5. The estimate shows a mistake
of 30 cubic feet of teakwood
in the wrong side. This details
an increase in the estimate
of Rs 90, raising it from
Rs ~~9220~~ 9230 to Rs 9320.

6. The Bridge plan should
be signed by the Executive ENT.
of the District Board before
the work is commenced.

7. Subject to the above
modifications the estimate
is approved.

15/5/97

CE 515
14/5 97

No. Public Works Department.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Read the following

Letter from the Supdtg. Engineer, VI Circle, No. 486 M.
dated 31st March 1897
Note by the Chief Engineer, P. W. D.

Para. 1 of the C.E.'s note shows that the water-way of the bridge will be close to the margin of safety. Seeing that the last bridge is said to have been washed away for want of sufficient water-way, I would suggest that a water-limit may be sanctioned in the case of this bridge. I think the Local Engineer should be able to give a positive assurance that the proposed water way is sufficient, before this work is sanctioned.

S.S.H
24.5.97

The estimate, amounting to Rs 9320 as altered by the Chief Engineer, for constructing a girder bridge of 5 spans of 25 feet each across a surplus channel from Ramnad tank at the 65th mile of Road No. 2 Madura to Ramnad in the Madura district is sanctioned.

2. Attention is drawn to the Note by the Chief Engineer.

3. This sanction is registered as Local No. W of 1897-98.

21/5/97

By order,
C. Ward
21/5/97.

To
The Supdtg. Engineer, VI Circle R.P.
" Local & Munpl. Dept. with 6 cards.

(40—4,000—2-11-95.)

H.E. 21-5-97 R 25-5-97

Public Works Department.

Current No. 3410
Letter No 486
Dated 31st March 1897.
From the Supt: Engr. VI Circle.

NOTE BY TECHNICAL SECTION.

Dw
Recorders
Cs
8/5/97

Name of work Constructing a Girder bridge of 5 Spans of 25 ft. Each, across a Surplus Channel from Ramnad tank at 66th mile of Road No 2, Madura to Ramnad in the Madura District.

Amount of Estimate Rs: 9,230.

The Estimate now submitted is a fresh one, prepared as per instructions contained in Chief Engineer's Memorandum No 3597C dy 17th Oct: 96.

Chief Engr's para (1). Hydraulic details.

The Hydraulic details now submitted by the Dist: Board Engr are not quite clear.

It is stated that the fall of the Surplus channel is 4·4 ft. per mile.

Area of Cross Section, 777 Sft.
Wetted Boarder, 200 ft.

If the fall of the channel has

from each
has been ascertained, the
Section of the same ought to
have been submitted.-
How the area of the Cross
Section and the Wetted Border
were found out are not clear.-

According to Cross Section
given on plan the Sect= area
is 616.30 against 777 Sqft.
in L.F. Engrs Calculation Sheet.

$37 \times \frac{3.2+2.6}{2}$	= 107.30	Portion of area intact
$25 \times \frac{2.6+3.1}{2}$	= 71.25	
$25 \times \frac{3.1+3.7}{2}$	= 85.00	
$25 \times \frac{3.7+5.6}{2}$	= 116.25	
$20 \times \frac{5.6+0.0}{2}$	= 56.00	
	435.80	
$60 \times \frac{0.0+1.13}{2}$	= 34.00	The area for the portion of C-S, marked in pencil legend is added as the H.W.L should be produced & meet the high ground on the left side.
$50 \times \frac{1.13+3.18}{2}$	= 107.50	
13×3 =	39.00	
Total Sqft = 616.30 ✳		643.29

Sectional Areas taken out by Graph from left to right-

$\frac{25 \times 1.5}{2}$ ...	= 18.75
$\frac{62.7 \times 1.5 + 4.6}{2}$	= 72.42
25×4 ...	= 100.00
$25 \times 4 + \frac{3}{2}$ ...	= 87.50
$54 \times \frac{346.5}{2}$ ...	= 256.50
$\frac{2.5 \times 6.5}{2}$	= 8.12
	643.29 Sqft.

I make it = 643.29

There appears the a mistake regarding the value of H.W.L (the H.W.L marked on plan and C-Section is "21.00", but in the L.F. Engrs Calculation Sheet the value given is "22.50"- and his calculations are based on the latter figure- If this increased value is taken the Sect^l area will come to 998.40 Sqft-

Hence his 777 Sq.ft. or more

we must go by this section-

Admitting however that the Sect^l area and wetted border given by the L.F. Engrs are correct,

the

the discharge of the stream, as worked below, will be 3,341 ft. per Sec. against 4,087 cft arrived at by the L.F. Engr.

Sect^l area 777 Sqft.
Wetted border 200 ft.
H.M.D. (r) = $\frac{777}{200}$ = 3.88
Fall of Stream (S) = 4.4 ft. per mile.

$V = C\sqrt{r \cdot S}$
$D = A \times V$.
Value of C, according to Table III of Irrigation Manual, page 140,
= 75.45 ✓
$\sqrt{r}$ = 1.97
$\sqrt{S}$ = .0289 ⊛

$V = 75.45 \times 1.97 \times .0289 = 4.30$ ft. per Sec.
against 5.26 of L.F. Engr's-

$D = 777 \times 4.30 = 3341$ cft. against 4087 cft of L.F. Engr's

The formula (Table is also given in professional circular No 4) adopted

3-12-79
Fair Copy work

$V = \frac{1}{\sqrt{0.0000\,8534\left(\frac{r+1}{r}\right)}}\sqrt{rS}$

$r = 3.88$. $S = \frac{4.4}{5280} = \frac{1}{1200}$

$\therefore V = \frac{1}{\sqrt{0.0000\,8534 \times 1.25}}\sqrt{0.00323}$

$\sqrt{\frac{4.4}{5280}} = \frac{2.098}{72.66} = .0289$ ⊛

72.66) 2.098000 (.0289
14532
64480
58128
63520
65394.

$\therefore \log v = \frac{1}{2}\left[\log 0.00323 - \left(\log 0.0000\,8534 + \log 1.25\right)\right]$

$\log 0.00323 = \bar{3}.509\,20$
$\log .0000\,8530 = \bar{5}.930\,95$
Prop: 51 : 5 = 25 : $\bar{5}$
$\log 0.0000\,8534 = \bar{5}.931\,205$
$\log 1.25 = 0.100\,37$
$\log 0.0000\,8534 + \log 1.25 = \bar{4}.031\,57$

$\therefore \log v = \frac{1}{2}\left(\bar{3}.509\,20 - \bar{4}.031\,57\right)$
$= \frac{1}{2} \times 1.477\,63 = 0.738\,81$
$\therefore v = 5.48$ against the L.F. Engrs calculation of 5.26
$\therefore Q = 777 \times 5.48 = 4258$

To discharge the above 3341 cft of water through the bridge, assuming the afflux or increased water level above bridge as .50 and taking 0.80 as value of C for bridges according to Irri- Manual, page 69, the clear length of bridge will be-

$\frac{3341}{.80\sqrt{64.4 \times 50}\left(7.5 + \frac{2 \times 1.5}{3}\right)}$

$= 0.8 \times 8.02 \times .706 \times 7.83 = 35.52$

$= \frac{3341}{35.52} = 94$ against 104 ft arrived at by L.F. Engr's

the

The water way allowed in plan
5 Vents of 25 ft- span each
= 125 ft
Remt. 94 " as per above results
31 ft- Extra length allowed in plan.

The L. F. Engineer states in his calculation sheet that the discharge through the bridge is 7,500 cft. per Sec. with a head of 6 inches. The formula used by him is not understood.

Treating the bridge as a drowned weir, the discharge I get is -

$D = LC\sqrt{2gd}\left(dd + \frac{2d}{3}\right)$

$= 0.8 \times 8\sqrt{.50}\left(7.5 + \frac{2\times\frac{1}{2}}{3}\right)$

$= 6.4 \times .707 \times 7.83 = 35.43$

for 1 ft in length.

$\therefore 125 \times 35.43 = 4429$ cft. per sec.

The discharge from the tank ^ weir as per L. F. Engrs calculation is 3324 cft per sec. adding to it 2464 cft; the discharge of two breaches, the total surplus escape from the tank is 5788 cft per sec.

The capacity of the bridge as per my calculation, ^ with the data furnished by L. F. Engr, is only 4429 cft and that of the surplus channel is 3341 cft - There is evidently something wrong in the quantity of discharge through the breaches and it cannot be checked without Longl + Cross sections of the breaches -

But, as pointed out ^ above 777 is excessive

Taking sectional area = 643.

$v' = \frac{643}{200} = 3.21$

and s is constant $= \frac{1}{1200}$

$\therefore v' = \frac{\sqrt{0.002675}}{\sqrt{0.00008534 \times 1.31}}$

$\therefore \log v' = \frac{1}{2}\left[\log 0.002675 - (\log 0.00008534 + \log 1.31)\right]$

$\therefore \log v' = \frac{1}{2}\log 1.37704$

$\therefore \log v' = 0.68852$

$\therefore v' = 4.88$

and $Q' = 643 \times 4.88 = 3138$ cubic feet per " which is the correct discharge to take -

The sectional area of the water at the bridge, taking dimensions according to scale, is 600 square feet exactly between piers.

∴ The velocity through the bridge will be $\frac{3138}{600}$

$= 5.23$ which is suitable, and it will be considerably reduced by scouring out towards the flow level below.

∴ If the bridge is nearly required to discharge water at M.F.L + 21.00 due to a bed fall of 4.4' per mile the design may be passed. But the simplest way would be to take the weir discharge which - in spite of what is said about additional discharge through breaches appears from the survey to be the only water which finds its way through the bridge. But it is impossible to calculate the weir discharge from the information given (the L.F. Engineer's) unless shown - the so-called weir is really a surplus channel of 9 vents each 4'x)' with a head of 0.5' to the top of the sills or 8.5' to the top of vents -

Then $Q = cLv = cL\sqrt{2gh}$

$= 0.62 \times 26^2 \times 8.02 \times 2.9$

$= 3634$

∴ Velocity through bridge

$= \frac{3634}{600}$

$= 6$ feet per " which is allowable -

But if there is any scour than this appears

to be the case the survey plan shewing the tank + its surplus channel the positions of the two breaches in the tank bund, the discharge through which is said to fall into the surplus channel, and those of the two other breaches, which it is said, will not affect the bridge, are not shewn -

Owing to so many defects as pointed out above, I beg to submit that, to be on safe side, it is necessary to know the drainage area of the C.B. above the tank so that the actual quantity of surplus from the tank may be ascertained and the waterway of the bridge designed accordingly -

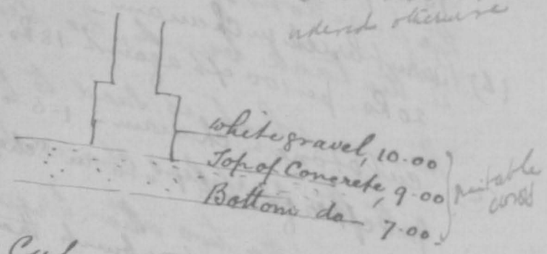
'Stone preferable to vitrified brick for foundations'.

The S.E. states that the L. F. Engr retains vitrified bricks for concrete

Chief Engr's (2) para -

Concrete since stone cannot be obtained except at great cost.

(3) Foundations — one mass of Concrete is now provided as ordered, but the bottom of Concrete, as given on plan, is 3 ft. below gravel instead of at 2 ft. thus —



(4) Cut water on the down stream side is now omitted. Stone facing is not provided in the Estimate for the cut-waters on the up-stream side as ordered - Reason not given - It is presumed that cut stone cannot easily be got -

(5) Two girders 15"×6" are now provided as ordered -

Concrete & the of brick in chunam - Superstructure to be built of brick in chunam and plastered with Portland cement - Cut stone slabs (2'×1½'×½') are provided under girders - and also for the coping of parapet walls -

Leak

Discharge to be provided for as likewise gravity by is desirable.

Teak joists 4"×6" and planking 3" thick are provided for the road way —

Rates — the following rates are in excess of the schedule rates —

(a) Concrete with broken brick in chunam 15 Rs per 100 cft against Rs. 10 in Schedule

Rs 10 is very low

(b) Burnt brick in chunam — 20 Rs. per 100 cft against 18 Rs — do —

(c) cut stone in chunam - 1-6-0 & 1-8-0 per cft against 1-4-0 in Schedule —

(a) Ikeg to submit that Rs 15 may be passed if the Concrete is ordered to be made of Surki and chunam —

(c). Dressed cut stone work cannot be done for 1 Rupee a cft. the rate provided in the Estimate is fair & may be passed

(b) - Orders required as to whether Rs: 20 may be passed -

Owing to a mistake in the Estimate, the teak wood, as corrected in this office, exceeds by 30 cft, which, at Rs. 3 per cft, amounts to Rs: 90 - The amount of the Estimate is thus increased from Rs: 9,230 to Rs: 9,320 —

the

(6)
(8)

The site plan has been countersigned by the President, District Board, but not the Bridge plan and Estimate.
The Board's Proceedings No 215 dated 18th January 1897, sanctioning the fresh Estimate is submitted.

H
8/5/97

L. F. DEPARTMENT.

No. 356

MADURA DISTRICT BOARD OFFICE,
November 1896.

From, J. Twigg Esquire,
President of the District Board,
MADURA.

To,
The Chief Engineer to Government,
Madras.

Enclosures.

Sir,

I have the honor to request that you will be so good as to inform me if the plans and estimate for the construction of a bridge in the 65th mile of Road No 2 - Madura to Ramnad, which were sent to your office by the Superintending Engineer, 6th circle, in his No 594. M & 1—6—96, have been scrutinised by you and transmitted to Government for sanction.

I have the honor to be
Sir
Your most obedt servant

for President.

5031-3557c

Public Works (1896) Department.

No 4257 C of 19-11-96

Current Numbers: 1000

Recd: 6.11.96

Memo

In reply to letter from the President, District Board Madura, No 356 dated 2nd Nov: 1896, the undersigned has the honour to state that the plans & estimate for the bridge in question were returned to the Supt Engr VI circle for revision, with this office No 35-77 C dt 17 Oct 1896.

Cos

17/11/96

I
B
Clk 96

To the President Dt Bd Madura 19/11/96

INDEXED.

LOCAL FUND DEPARTMENT.

189 .

From,

The President of the District Board, Madura.

To,

The

Dated
Received

No.
Enclosure.

Subject.

No 3697 C of 17-10-96

Public Works (1896) Department.

CURRENT No. 7714

Order

From

The Supty. Engineer
VI Circle.

No. 1057/M.D

Dated 23.8.96
Received 25.8.96
Enclosures -
Spare copies -

SUBJECT.

Bridge in the 65th mile of road No: 2 Madura to Ramnad.

Submitting copy of letter from the President, District Board, Madura requesting to communicate sanction of the Estimate for a ——

I
Plans expedite
distribution of the estimate
Cos
26/8/96

P. W. 29
1,000—5-5-96.

O.L.S. 418 R16/10

BACK PAPERS.

G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date

From the President, Dt. Board, Madura, to the Supg Engr, N Circle, No: 356 Dt. 19 August 1896:—

Reference:— This office No: 356 27-5-96

—

I have the honor to request that you will be good enough to communicate the sanction of the Chief Engineer to work for the estimate of Rs 9000 for a bridge in the 65th mile of Road No: 2 Madura to Ramnad, sent with this office letter quoted above.

The Dt. Board Engineer wishes to invite tenders for the work as soon as possible, it being most difficult to do work near Ramnad.

—

No 1057 md,

Copy submitted to the Chief Engineer, P. W.D., for orders, with reference to this office No: 594 Md. Dt/ 1st June 1896.

× C No 5031 with Y.

Supt Engr's office Trichinopoly. 29th August 1896.

W. Hughes
Supg Engr, N Circle

21/8

From

The Supt.g Engineer
Madura.

To

The Chief Engineer
P. W. D.

No. 1057 md
Dated 23d August 1896
Rcvd 24/—

Bridge in the 65' mile
of Road No. 2 Madura to
Rammad: ——

Submits for orders
Copy of letter from the President
District Board, Madura,
requesting to communicate
the sanction of the estimate
of Rs 9000 for a ——

OFFICE OF THE SUPERINTENDING ENGINEER,
6TH CIRCLE,

No. 594 md, 661/W

Trichinopoly, 10th June 1896.

From W. Hughes Esqr
The Sperintending Engineer,
6th Circle.

To

The Chief Engineer,
Public works Department.

SIR,

ENCLOSURES. 6

1. Plan of bridge
1. site plan
1 Report -
1 specification
1 Estimate complete -
1 Proceedings of the Dt Board Madura No. 611 15-5-96 -

I have the honor to submit for sanction an estimate amounting to Rs 9000 for a girder bridge of 5-25ft spans across a surplus channel from Rammad Tank in the 65' mile of the Madura - Rammad Road.

2. The original bridge which was destroyed in the floods of 1075, owing to insufficient waterway, had only 5 vents of 9 ft each with roadway carried on rails. The remains of this structure will be removed and the course of the stream cleared of all obstructions.

3. The present design provides sufficient waterway to pass the maximum discharge from the surplus weir of the tank and from some outlets or breaches which are

100-20-1-96

usually opened in floods. The total discharge is estimated to be under 6000 c ft per second which the bridge will pass with a velocity of 5 ft per second with water level 3 ft below the girders -

4. I agree with the District Board Engineer as to the most suitable type of bridge for the locality. The position of the bridge, and some other points, were discussed with me. I have somewhat altered the details of the foundations. This and corrections in the calculations bring the estimate to Rs 9000. I think the design as it now stands meets all requirements.

I have the honor to be
Sir
Your most obedient Servt

W. Hughes
Supt'g Engr Circle -

P. W. D. 6th CIRCLE.

P. W. CORRESPONDENCE No. 5031

FROM

THE SUPERINTENDING ENGINEER,

6th CIRCLE.

TO

THE CHIEF ENGINEER,

P. W. D.

NO. 594 md

Dated. 1st
Received. 2 } June 1896.

Enclosure. 6

Girder bridge of 5.25 ft. span across a Surplus channel from Rammad South on the 65 mile of the Madura — Rammad Road: —

submits for sanction an Estimate of Rs 9000 for a ——

Recd 5th Cancelled

Accs: 3.6.96

ent.

Indexed.