

(1) Number of pages _____

(2) Date of repair _____

(3) Initials of the Referencer _____

MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No.	1822	Press
B.P. No.		Mis.
Dated	19-7	195
		2876

Not to be folded or roughly handled

No 94 District Engineer's Office, Trivellore
Palamcottah, 10th September 1871.
From,

Print

J. W. Rendall, Esquire
District Engineer, Trivellore.

To,
Colonel G. W. Walker, R. E.
Chief Engineer, D. P. W.

Enclosure 1.
Survey Plans.

Sir,
There are several points connected with the Suttur Bridge on the Road between Palamcottah and Madurai — now under reconstruction for the second time, which I desire to lay before you and request the favor of such orders as you may consider necessary.

1. Suttur is 50 miles north of Palamcottah; the Suttur or Vaipar River has its catchment basin above the point where the Bridge is constructed, of 758 square miles.

2. The original Bridge was designed by Col Horsley, R. E. and consisted of 15 semi elliptical arches of 18'0" span with piers 6'0" high. This Bridge was commenced in 1854, and completed in 1856, on an Estimate of Rs 24,620.

3. In November 1859, 7 arches were destroyed by a heavy flood.

4. The design for the first reconstruction was prepared by the late Colonel Winscom then District Engineer.

Engineer. This gentleman provided for increasing the waterway by adding two arches on the south side. The Bridge as restored thus consisted of 17 arches of 40 feet span.

6. There was some correspondence in 1860 between Col. Horsley, at this time Chief Engineer and Col. Winscom regarding the adoption of Iron Girders, but the scheme seems to have been abandoned by Colonel Winscom on account of the expense, also as appears from the District Engineer's letter No 16 of the 18th May 1861, because Colonel Horsley had expressed an opinion that the failure of the original Bridge was not due to insufficient waterway, but was caused by the bursting of tanks. This opinion is recorded in Proceedings of the Chief Engineer No 7246 of the 22nd November 1860. The occurrence of a flood similar to that of 1859 was not however a "remote contingency" for a second and occurred just 10 years after the first, — in November 1869.

7. The Estimate for the first restoration amounted to Rupees 15,800, and was sanctioned on the 11th December 1861, a supplemental Estimate of Rupees 6,200 was afterwards sanctioned on the 25th August 1863. The total cost of the first restoration was Rupees 22,057-14-0.

8. In his letter forwarding the Estimate of Rupees 15,800 (No 16 dated 18th May 1861) Colonel Winscom states the cross sectional area of the

stream during the flood of November 1859 was 15,088 square feet. Two cross sections are given on the original plan which is in my office, but the level is not referred to any point on the Bridge. I find however from Major Payne's report of the fall of the Bridge on the 6th November 1859 (vide his letter to Deputy Chief Engineer No 116 of the 24th November 1859) that the highest watermark on this occasion differed only 0.02 from that of 1869, being 13.27 above plumb in 1859 and 13.25 in 1869.

9. Against this area of 15,088 Colonel Winscom states that he has provided a waterway of 11,237 square feet, but in this, are included the whole area of the arches and spandril arches. As the flood of 1869 rose only to the floor of the spandril arches, the restored Bridge had an area of only 9,503 square feet, to which the single arch Bridge in the south approach added but 1,218 square feet.

10. The waterway after the first restoration was thus clearly insufficient, but the destruction of the Bridge was rendered a more thorough certainty by the work in the foundations being (as I believe) scamped in the execution.

11. The foundations were put in by Superintendent (now Sub Engineer) Minnappa Pillay who appeared after the completion of the foundations to have handed over the work to Mr. McLeod, who is I am given to understand now employed in Travancore.

The depth of the pier foundations shown in Colonel
Wincomb's plan is 9' 0" below plinth and 6' below
lowest point of floor. Two of the piers nos 7 & 10 from
the north built by Munappa Pillay were removed
by us in May last, sand being struck by the
shallowness of the foundation, I measured as
accurately as I could the depth below plinth at
which they were founded, and ascertained that
in the case of no. 7 the foundations were laid
15' and in the case of no. 10, 11' 60" below plinth.
The work was rough stone boulders in clay
founded on the sand.

2. As before stated, Colonel Wincomb's
plan shows a depth of foundation of 9', but in
the case of the two piers removed by us, I could
not achieve this depth was not reached.

The waterway being 4627 against a river
channel of 15088 square feet and the foundations
being of rough stone in mud on sand, at a
depth of about 2' below the lowest point of the
floor, I can only conclude that nothing but
moderate freshes occurred between 1863 &
1864 when the Cyclone of the 16th November 6 arches
were again destroyed.

I should here explain that piers nos
11 from the north are on the sandy bed of
river, and it is these which have failed in
this case. I find in Colonel Stansley's diary
July 1854 that in the original Bridge stiff
was met with at 9' depth and that the
foundations

foundations were laid on this.

15. While working this year we have found
that clay was met with from 9' to 17' below the
river bed and our wells have been carried down
to this, except in one case where we found
on concrete, clay being met with 9 1/2' below plinth.

16. The Bridge is now being reconstructed
on an estimate of Rupees 30,000 on a design pre-
pared by Mr. Mc. Hain Sub Engineer under inspec-
tion from Lieutenant Colonel Roberts R. C. who
that gentleman was Superintending Engineer of
the 8th Division.

17. In this design 5 arches are substituted
for the 6 which fell, but very little increase of
waterway is thus obtained. Both in 1859 and
again in 1869 the south approach to the Bridge
was breached. The breach which occurred in
1869 has never been filled in but has been form-
ed into a Road dam. Colonel Roberts may
have been of opinion that the extra waterway
afforded by this Road dam was sufficient.

18. I have however investigated the matter
as fully as I can, and my calculations lead
me to think that additional waterway is
absolutely necessary for safety. I therefore request
your consideration of the following points and
the favor of your instructions, so that if
possible future accidents to this Bridge may be
prevented.

prevented.

19. It is difficult to state with exactitude the discharge of the River at Sattur during floods. The River tops its ordinary Banks and floods a considerable tract of land. The accompanying survey shows the position of the Bridge.

20. I have had cross sections of the River taken both above and below the Bridge. Taking the section $\frac{1}{4}$ mile above the Bridge where the stream is well defined, the water standing at the flood level of 1869, the sectional area of the deep stream is 12215 and of shallow stream 907 square feet.

A section parallel to and above the Bridge was even more than this, but a section on this side can hardly be considered normal. The average bed fall for a mile above, and a mile below the Bridge is 5.10 feet per mile. Assuming a surface fall at 5' per mile in each case, the discharge of the deep stream section is 95,277; and of the shallow section (that is over the mound) 28,798 cubic feet per second.

This is a very heavy discharge from a catchment basin of 758 square miles. Cast on the form of Major Pyne's formula it would be represented by $1501 M^{\frac{2}{3}}$ for cubic feet per second, and is more even than Colonel Dickenson's formula $825 M^{\frac{2}{3}}$ would give. The error if there is, is probably in the assumption that the water in

in the shallow section moved with a velocity due to 5' per mile fall.

23. The level of the flood, borne out as it is by Major Pyne's observation of the maximum level in 1859, cannot I think be doubted.

24. The Road dam in the south approach and the small 20' Bridge have at flood areas of 2646 and 126 square feet respectively. The Bridge as now being built has only an area of 9607 square feet to the same level, total 12314 square feet available waterway. The Bridge would cause an afflux of 1.8" and the velocity through it would be 10.8' per second. I have arrived at this conclusion by supposing the existing Road dam and 20' Bridge would take off 19,000 cubic feet per second at a velocity of (about) 7', and that the main Bridge would have to take 105,000 out of the total of 124,000 cubic feet per second.

25. It seems to me therefore essential to provide extra waterway and to reduce the probable velocity to 10' per second.

26. To effect this, I would propose 1st to add an extra span at each end of the main Bridge. Fortunately the wings are very long and will admit of a 36' arch being built at each end; 2nd to remove the present single span of 20' which is cracked and in bad order and build 3 or more spans of 21' in place of it; 3rd

of the present dam is $5\frac{1}{2}$ above the piers, it may therefore have 7' 9" of water in it and be impracticable during the height of a flood, but I see no help for this. By this means the waterway of the Bridge itself would be increased by 10,570 square feet, and the flood openings would give 3,250 more. If you consider this sufficient I will complete the designs. I estimate the cost at about Rs. 9,000 in all.

The Railway Bridge which is below ours and is now nearly completed, consists of 11 Girders openings of 70' each with piers 11' high and lattice girders about 6' deep. There is a flood opening south of the main Bridge also 70' span. The total waterway is about 11,500 square feet to girder level but as the openings are large and free, the afflux caused will be small.

There is one further point to which I beg to invite your attention, and on which I request the favor of orders, Colonel Roberts when the present estimate passed through his office, added the two following paras to the specification.

"The bank or causeway that was constructed a few years back for the protection of the town so contrived as to leave, in floods, a large head of water above Bridge, and as the flood subsides a most violent scour is occasioned. To unite this bank in question is to be connected with the western face of the north abutment of the Bridge."

"Bridge, and the alignment of the river bank to be carried down for 100 yards below bridge. The same should be done on the south side of the river in its right bank above and below bridge. Portia sticks and canal galls should be placed along these alignments. The cost of this service can be met from sundries."

"On the right bank, the Road is to be carried from the abutment at a slope of 1 in 24 until it reaches a point 2 feet below the intrados of the soffits of the original arches. A Road Dam 30 yards will be made there, and thus the Bridge will be relieved in the time of great floods from a considerable amount of flood water and be subjected to less risk. The cost of this service to be debited to Road Maintenance."

29. It seems to me that the embankment which is shown in the survey plan cannot in any way have assisted in the destruction of the Bridge, nor can I see any reason for altering the alignment of this embankment. The area flooded on the north side is insignificant compared with the area submerged on the south side.

30. A Road dam 2' below the intrados of the soffits of the original arches would be above the maximum flood level.

31. Please instruct me what should be done regarding

District Engineer.

4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 8

[illegible][illegible]

No 162 Timmelly District Eng. Off.
Camp, Sholapuram: 26 January

J. W. Pundall Esq.
District Engineer
Timmelly

Colonel G. W. Walker, B. C.
Chief Engineer D. P. W.
Madras

I beg to invite your attention
to my letter No. 94 dated 14 September
1874 regarding the insufficiency of water
way in the latter bridge, which has
been recently constructed, and to re-
quest the issue of orders as to what you
consider to be necessary to render the work
secure from further accidents.

2. The reconstruction of the bridge
is practically completed, only plastering
remaining unfinished, and the bridge
has been opened for traffic since the
1st instant.

3. There will be a saving of Rs 3000
on the sanctioned estimate of Rs 30000,
which sum has been lent to the Local
Fund Board by Government for this work.
I would propose to build 2 extra arches
and ask the Local Fund Board to
allot the saving on the present estimate
should

402288911 Dec 1/91
24.10.2522 Dec 1/93.
81 - 135 July 73

J. W. Pundall Esq.
District Engineer

From: No 5678.
The District Engineer

For the Chief Engineer
D. P. W.

Dated 10th September 14
Received 9th September 14

Encl: 1. Plan of bridge
to K. K. S. S. S.

3 maps to notice

Several points connected
with the latter bridge

more under reconstruction
and requests orders on

the subject - 1/10005/1

Memo No 14295 dated 1/10

Should you, for the reasons given in my
letter under reference, consider such
an addition to be necessary.

I have the honor to be
Your most obedient servant
J. W. Russell
District Engineer

P. W. 1875 Depart.
- Irons, No 674
The District Engr
J. W. Russell
The Chief Engineer
D. P. W.

Dated 26th
Received, January 11th 1875

Requests the favor of
orders on his letter
reporting regarding
the insufficiency of
water way in the Sattur
Bridge - M. 835/96
Memo No 142/5th Feb/75

No 3

No 142 Fort St George
9th Feb 1875
Memo

With reference to letters from the
District Engineer Trinnevelly, Nos 914 and 162
of 4th September 1874 and 26th January 1875.
The Chief Engineer requests that he may be
supplied with sections taken of the Sattur
River, on a natural scale as regards
the portions including the actual River
Bed, with a longitudinal section of the Bridge
as constructed, laid down on the scales at its site.
2. The floods which caused the destruction
of former Bridges having been attributed to the
breaching of Tanks in the Stricella
putoor and Sattur Taluqs, the Chief Engineer
desires to be informed whether measures have
been adopted to obviate all danger from
them in future, to the satisfaction of the
Chief Engineer for Irrigation.

Signed G. W. Walker Col R.E.
Chief Engineer D. P. W. Canton
To The District Engineer
Trinnevelly

N^o 4

N^o 191.

District Engrs Office Summerville
Palaucoctah 17th March 1875
10

Am

J. W. Rindall Esq
District Engineer of Summerville
Colonel G. W. Walker R. E.
Chief Engineer S. W. D

I have the honor as directed in
your Memo N^o 142 of the 5th February
last to forward herewith the section
of the River at Site of and above
and below the Satter Bridge.

2. Attention is being paid to
improving the Escapes and strengthen
the Bunds of the Sanks in the base
of the Satter River above the Bridge
but it will be a work of time, depen-
ding on the amount of funds given
to have all the Sanks put into sa-
tisfactory order. -

3. There is no doubt that the
floods of 1859 and 1869 were
increased to a very considerab-
le extent by the breaching of Sanks

Encls. 1. Plans
sent Separately.

Have the honor to be
Your most Obed Servant

J. W. Russell
District Engineer

P. W. No. 1868
No. 191

From No. 1868

The District Engineer
Tumacacui

The Chief Engineer
S. P. W.

Dated 17th March 1875
Received 22nd

Enclosure 1

It forwards the sections
of the River at site of &
above and below the
Sattur Bridge as
directed in Memo No.
142 of the 5th January
1875. M. 825
7/76

No. 15 Memorandum 15 May 1875

The Chief Engineer must have
the subject of the Sattur Bridge to be dealt
with by the Chief Engineer for Irrigation.
There can be no doubt that
under existing circumstances additional
waterway is required, which probably
can best be given in the manner
recommended by Mr. Russell. But it is
doubtful how far Local Funds can be
indented on for the purpose. It would
appear that though attention was called
so far back as 1861 to the necessity for
putting the Tanks of the Streetallipattoor
and Sattur Talook into an efficient state
of repair, they are still imperfectly provided
with escapes and their bunds require
strengthening.

The District Engineer of
Tumacacui had better be called on to submit
Plans and Estimates of the additional work
that seems to be necessary, through the
Chief

Chief Engineer for Irrigation who can
then report whether it should be carried out
with Agricultural or Provincial Funds.

Signed C. M. Walker Colonel R.E.
Chief Engineer D.P.W.

3029

Memo. 13

The Chief Engineer for Irrigation
thinks that the failure of the Sature bridge
was due to inadequate foundations inefficiently
protected and that future security will best
be obtained by aprons above and below, and
by constructing a road dam in the South
embanked approach. This road dam should
be as long as the space available will allow
or to afford 3500 square feet additional
waterway and the road levels at it should be

* The more nearly
the level of the dam
corresponds with
that of the Camby
the better, provided
that level be in
above ordinary
4 in 100 grade
about 6 feet below flood level, or 7 1/2 feet above
the present (foundation affords?) of the bridge
then ramps at either end of the road dam on a
level in 30. It may of course extend over the
site of the 1 arch bridge reported to be
cracked.

And the river being one which overflows
the adjacent ground to a great extent, the
length of waterway is an important element
of safety, and it is probable that with a
road.

road dam such as has above been suggested
the velocity through the bridge would be much
diminished and further accident avoided.

In ordinary seasons but little water will pass
over the dam and after heavy rain all the

stoppage of traffic for a few hours will be
of little consequence. The additional arches

in the wing walls of the bridge, will not be
necessary. The north end of the abutment

should be placed as near the bridge as may
be convenient.

Submitted by J. M. Mullins A.C.E.

The undersigned requests the
Engineer to consider with reference to his
as per margin, to reconsider the subject of
affording additional water way at and near
the Sator bridge, in connection with the
accompanying memorandum by Colonel
Walker and Lieut Colonel Mullins
and to forward his matured designs &
estimates as soon as possible.

N 3028

Submitted J. M. Mullins A.C.E.

Specification Report to accompany estimate N 3028
for constructing a Road Dam of 320 yards on the
south side of Sator Bridge on Road No. 1, Palam
Bachana and providing rough stone aprons for
the 11 arches of the main bridge.

1. The amount of estimate Rupees 11,700
2. After the side lines of excavation have
been approved of, earth to be excavated to the full
depth.
3. Concrete. The trenches being finished, the
concrete to be laid in them under orders from the
officer in charge. The concrete to be composed of
parts of broken stone and brick mixed well worked
up with 1 part of hydraulic mortar. The
concrete to be raised in layers of 6" each to be taken
that no new layers is added before the one
immediately underneath has been properly
consolidated.
4. Rubble in mortar. On the completion of the
concrete, the centre lines will be carefully laid out
and breadth of walling marked. The footing course
to be laid according to the drawing. The whole of
the foundations and superstructure to be built of
roughly squared wedged stones in mortar to be
as uniform in size and as rectangular as
possible. Each course to be levelled up and finished off.
5. The earth Road to be raised & cut to the
level of dam and well rammed down over which
there is to be 12 inches of hard stone broken in
1 1/2 inches cubes and covered by 3 inches of good
gravel and well watered and tamped.
6. Apron. The apron to the bridge to consist
of closely packed large boulders, laid with their

Net alling: _____
Road way: _____ 1 1000 1000 16 1 16,000

| | | | | | | |
|---|---|------|------|--------|-------|--------|
| Being equal to cubic yds. | | | | | | 16,000 |
| Earth work: | | | | | | 593. |
| bitting & raising Roadway | 1 | 1000 | 1000 | 18 1/2 | 1 1/2 | 27,375 |
| Earth work cubic feet. | | | | | | 27,375 |
| Being equal to cubic yards. | | | | | | 1014 |
| Rough Stone bedded in concrete. | | | | | | |
| Apron between body
and retaining wall. | 1 | 990 | 990 | 10 1/2 | 1/4 | 22,275 |
| Rough Stone bedded in concrete cubic feet | | | | | | 22,275 |
| Being equal to cubic yds. | | | | | | 825. |
| Loose Rough Stone: | | | | | | |
| Litching | 2 | 12 | 24 | 1/4 | 12 | 612 |
| Loose Rough Stone cubic feet. | | | | | | 612 |
| Being equal to cubic yards. | | | | | | 22 3/4 |

Providing common Rough Stone apron for a length of 11 arches from the North abutment above and below the floorings of Sattur Bridge.

| | | | | | |
|-------------------------------|-----|----|-----|--|---------|
| Loose Rough Stone: | | | | | |
| Aprons: | | | | | |
| above flooring | 154 | 13 | 3/4 | | 346 1/2 |
| Below | 154 | 5 | 3/4 | | 577 1/2 |
| Loose Rough Stone cubic yards | | | | | 924. |

Abstract
924 cyds Loose Rough Stone at 2 Rs = 1848
Recovering foundation. sundries Rs = 152 = 2000.

Abstract Estimate No 9 of 75.76.

Innevelly District Sattur Taluq.
Work: Constructing a Road Dam of 320 yards on the south side of Sattur Bridge on Road No. 1. Palamcottah to Madurai and providing rough Stone aprons for the 11 arches of the main Bridge.

| Quantities | Description of work. | Rate | Amount | Total. |
|------------|---|----------|---------|--------|
| 534 1/2 | cyds concrete. | at 3 | 1603 8 | |
| 1166 | " Rubble in mortar | at 3 1/2 | 4372 8 | |
| 593 | " Metalling (broken stone & gravel) | at 1 | 593 | |
| 1014 | " Earth | at 2 | 126 12 | |
| 825 | " Rough Stone bedded in concrete | at 2 1/2 | 2268 12 | |
| 22 3/4 | " Loose Rough Stone for pitching | at 2 1/2 | 57 3 | |
| | Removing old Bridge | 100 | 9115 11 | 0 |
| | Providing Loose Rough Stone apron below and above floorings of Sattur Bridge. | | 2000 | 0 0 |
| | Excavation for foundation & filling in re | | 384 | 5 0 |
| | Retain Establishment | | 200 | 0 0 |
| | Total of Estimate Rupees. | | 11700 | 0 0 |

I do hereby certify that the above Estimate provides for every thing necessary & that no supplementary works will afterwards be required.

District Engineer Office
Palamcottah
28 July 1875.

J. D. Grant.
Offr District Engineer
Innevelly

No. 35. District Engineer's Office, Trivello
Palamcottah, 2nd August 1875

From J. D. Grant Esquire
Offr District Engineer, Trivello
I have the honor to acknowledge the receipt of your letter of the 28th July 1875.

Major J. D. Grant Esquire R. E.

Offr Chief Engineer for Irrigation.

Sir, I have the honor to acknowledge the receipt of your letter of the 28th July 1875.

and in accordance with instructions conveyed to me by the Chief Engineer of the 22nd May 1875.

I have the honor to forward to you an estimate of Rs. 11,700 (with plan and section) for the construction of a Road dam to relieve the

Sutter Bridge and for an apron above and below the Bridge.

1. The Road dam is of the length specified by you viz 600 feet with a ramp of 1 in 30 at each end and the level of the Road dam being fixed at 6 feet below maximum flood level the additional waterway thus afforded is 4,680 square feet. The level given to the dam is slightly above ordinary moderate freshes and but little interruption to traffic will be caused except in high freshes.

2. The additional waterway will reduce the velocity through the Bridge to about $9\frac{1}{2}$ feet per second but the calculation of the discharge of the River is most unsatisfactory, different methods producing very different results. It is

Very respectfully,
J. D. Grant

District Engineer

Enclosed - 2
Plans
Estimate with
specifications.

1/1501/35

835

1/1501/35

1/1501/35

1/1501/35

1/1501/35

1/1501/35

1/1501/35

1/1501/35

1/1501/35

1/1501/35

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1/1501/35

1/1501/35

1/1501/35

Payable & Abstract Estimate
for constructing a Road
Dam 4325 yards on the
lower line of Balli
Kings in Road of
Palamcottah to the
provisionary Bridge and
apron for the 11 acres
of the lower lands.

Rs. 11,700

1/1501/35

1/1501/35

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1/1501/35

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1/1501/35

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1/1501/35

1/1501/35

1/1501/35

intended to remove the one arch Bridge reported cracked and to carry the road dam over its arch.

4. With regards to the protection of the Bridge itself, I have provided rough stone apron for 11 arches the rest requiring no protection as the river bed is of harder rocks.

5. The Apron allowed by me is 3 yards broad on the upstream and 5 yards on the downstream side. The depths in each case being allowed 3 yards. This will, I think, be sufficient for the protection of the foundations for the present. The effect of the road dam now proposed is apparent.

I have the honor to be
Your most obedt. servt

D. Grant

P. W. J. 55.
The Offl Dist Engineer
Sinnerly
The Offl Chief Engineer
D. P. W.

Dated 27
Received 27 August 1875

Enclo. 2. 10
Managers of the
It onwards for sanction
and estimate for the
construction of a Road
Dam to relieve the
Latter Bridge and for
Apron above and below
the Bridge. No. 825
8/26.

Irrigation.

12910

Memorandum.

The instructions given by the undersigned to the District Engineer Sinnerly with reference to Major General Walker's Memo. of the 6th May last will be found in two memoranda dated the 20th Idem to which Mr. Grant's letter No. 55 of the 2nd Instant is a reply.

2. It has been considered better both on the ground of economy, and because it is better to afford length rather than depth of additional waterway to provide for passing part of the flood waters of the Latur river across the Sinnerly and Ludhiana road by means of a road dam rather than by additional arches to the bridge. As possibly the question may be raised as to the effect of this arrangement on the Railway bridge

The above correspondence
arose from doubt expressed
by the District of Srinivally as
to the sufficiency of loanway
allotted for the Salim Bridge
recently reconstructed & so
that District an estimate
of Rs 30,000 sanctioned in G.O.
no 253 of 13th Feb 1894 (Smt. Dept.)
The subject was referred
by the Chief Engineer M.D. to the
Chief Eng for Srinivally on account of

of its connection with the State
of repairs of the Tanks of the Sec.
Williputthi and Sabar Salooko;
to which he remarked that
attention had been called
so far back as the 11th Dec.
1864 in G. O. No 228 P.M.D. The
latter officers now recommends
for sanction an estimate
of Rs 13200 for reconstructing
the Road Drain in the Southern
embanked approach on a
larger scale, and adding enough
stone aprons above and
below the bridge flooring,
observing that the failure
of the Bridge last constructed
was due to inadequate foun-
dations insufficiently pro-
vided - and he desires that
provision of funds being
made from the Agricultural
Allocation.

2. The Chief Engineer does not
think that local funds or
the Provincial Funds by
which they are supplemented
should be required to bear
more than the cost of pro-
viding waterway sufficient to

pass floods not suddenly
discharged into the contents
of breached Tanks. He would
be difficult to state what such
normal amount of waterway
should be, all existing data
relating to floods augmented
by discharges from breached
Tanks. Assuming the total
waterway of the Railway bridge
11500 square feet to be sufficient
to pass the heaviest floods un-
influenced by indirect tank
discharge, it appears to the Chief
Engineer, that Agricultural funds
should bear the charge of
providing all excess. Hence
as the newly constructed bridge
has only a waterway of 9500
square feet, the charge of Rs 11200
is an argument that to 14,000 square
feet should be divided between
local and Imperial funds
in the ratio of 2000 to 25000
in favour of Imperial Rs 5000
to local funds, and Rs 6200
to Imperial; local funds
of course paying the
Rs 2000 each of rough stone
aprons required for securing
the

the flooring of several Arches
of the two bridges.

3. But precautions being
better than cure, and in-
crease of waterway in the
deep sections of floods more
desirable than in the shallow
sections, Major General Walker
would suggest for Colonel
Drullman approval that the
sum of Rs 6200 should rather
be devoted to the special im-
provement of the Calingulaks
of the Sanks above the Bridges,
while Rs 5000 of local funds
should be spent in inserting
the 22 land Arches of 36 feet
each in the wing walls of the
Bridges recommended by
Mr. Drumball, and in restoring
the damaged bridge in the
Southern approach. It is
observed that the District
Engineer reports in one of his
letters an expected saving
of Rs 3000 on the purchase of
Rs 3000.

[Signature]

It may be argued by the
Local Fund Board that if
they are expected to provide
only 11000 square feet of
waterway they have done
as already by a Bridge affording
9600 square feet and a Road
Dam affording 2650 But
the prospect of a Road Dam
liable to be impassable for
hours during flood is not
a satisfactory one. They may
properly be called on to pro-
vide 11000 square feet of
waterway under Arch; and
permanent improvements to the
Sanks above may then enable
them to dispense with the
Road Dam altogether.

Signed G. H. Walker Major General
Chief Engineer D. M.

Fort St George
25th Jan 1876.

To The Chief Engineer
for Irrigation
with all the Correspondence

[Signature]

Encl. 9
to G.O.

Memorandum

The undersigned has, with reference to the memorandum, No. 163 of the 25th instant, of the Chief Engineer, Public Works Department, on the Satter Bridge, no further remarks to make on the arrangements therein proposed for providing waterway and securing the bridge foundations.

2. ... Instructions will at once be issued to the District Engineer, Simmelly, to give special attention to the tanks the surplus of which is discharged into the Satter river, and he will be required to lay down a programme for putting them all into proper order in all respects within a definite period.

3. Should the Government consider that a contribution should be made from Imperial funds, Agricultural, towards the cost of restoring and securing the Satter bridge, whatever amount may be contributed will, it is considered, have to be provided under Miscellaneous, and it will have to be determined whether the outlay should be

be treated as a new work or a repair. If the former, Budget provision must be made, while in the latter case the payment would be made from the Agricultural Repair Grant.

4. It has to be noticed in connection with the remark that so far back as 1861 the state of the tanks in the Shivelliputtur and Satten Taluqs was known to require improvement, that the irrigation works of the District generally were in the same state, that until very recently no increase of the repair grant could be obtained, that even now it is reported to be inadequate, that for minor new works, such as the sluices and escapes which the tanks especially need, the grant formerly was nominal, and is still much below that required to make even moderately fair progress with improvements of this class, and lastly the District establishment has not been equal to dealing effectively with more than a very small part of the work to be done. Only last year very extensive damage was done to the North Channel from the Shivguntur Ament by the breaching of numerous tanks above it, and

through

though attention has been called, and is being given to the subject, it will be necessarily a considerable time before a real impression can be made upon the state generally of the large number of works which never as yet have been safe or efficient.

Fortham George
27 January 1873

W. H. L. Smith C.E.
Chief Engineer for Irrigation

For the Chief Engineer P.W.D.

P. W. 1876 Dept
No 835

From the Chief Eng^r
for Irrigation

Dated 27th Jan^y 1876
Rec^d 2nd Feb^y 1876

8^x No 114.

& 1 plan given to Librarian
Regarding the securing and
restoring of the Patent Bridge

No 302, 1

put filed in
department

put filed in
department

put filed in
department

put filed in
department

Current No. *5118* of 1875.

Current No.

From

No.

Dated

Recd.

1876

Subject

LATER CASES.

Current No.

of 187

ENCLOSURES. 9

From

to

Orders and Proceedings in file.

| Department. | No. | Date. | ENDORSEMENTS. | | |
|-------------|----------|-------------|---------------|-----|-------------|
| | | | Department. | No. | Dated. |
| P.W.D. | 2286 | 2 Dec / 70 | Memo. | 15 | 23 May / 71 |
| | 2410 | 25 Aug / 73 | | 162 | 5 Feb / 73 |
| | 15 | 5 Feb / 73 | | 163 | 25 Jan / 73 |
| | 1st | 13 Jan / 73 | | | |
| | 2nd | 13 Jan / 73 | | | |
| Final Dy. | 1757 | 2 Dec / 70 | | | |
| P.W.D. | 186 | 24 / 2 / 74 | | | |
| X | L. to be | 10 / 3 / 75 | | | |

description of work proposed - work suggested without
it - builders will require further explanation
on sand! This doesn't ^{mean} I said on the following
rapid current!

if I am correct in this the foundations for new
work - has their status
should be disturbed instead ^{actually} been ascertained by boring
known & the reason ^{is} a ^{thorough} ^{one} -
announced to others of the ^{same} class -
Has it been ascertained
that the stiff clay is a
really solid bed - and
not one of the thin deceptive
strata which have been
found to have misled

Now as to the picture
I hesitate to sanction
the picture proposed

Engineers in other rivers -

2nd How has the traffic been
carried on since destruction
of arches -

3rd To what extent has it
been interrupted by floods

4th What ^{waterway} ~~is~~ the available
waterway at flood line of
the flood causing the last damage
of bridge with the new arches -
What is waterway at same level
of N. W. Bridge -

P. C.

No 835

No 570 dated 20 March 1876

The District Engineer,
Trincomalee, is requested
to furnish information
regarding the new
Satur Bridge, at an
early date, on the fol-
lowing points, viz.

1. What ~~was~~ waterway
now available, at
flood line of Nov. 1869.

2. What is the waterway
of Railway Bridge at
the same level -

3. How was traffic
carried on from 1869
till opening of the new
Bridge -

4. To what extent was it
interrupted by floods do-
ing that interval -

5. Was the nature of
the foundations of the
new bridge ascertained
by actual borings -

6. Was it ascertained
that the stiff clay wh.
was found, was a really
solid bed - not a thin
stratum -

MMW
17.3

31

N^o 12

N^o 37

District High Office, Dummerville
Palamcottah 22 May 1876

From

J. D. Grant Esquire
Off. District Engineer
Dummerville

To

Major Genl. G. W. Walker Esq.
Chief Engineer D. S. S.

Sir

Referring to your Memo N^o 510
of 20 March 1876, I have the honor
to reply as follows to the questions
asked regarding the Sattor Bridge.

See Mr. Sum-
malls' letter N^o
94 of 4-9-74
para 24.

1. The area of the Bridge itself at
the flood level of 1869 is 9617 sq.
feet and the other openings in
the approaches give an additional
area of 2770 making in all 12387
square feet.

2. The actual waterway of the Rail-
way Bridge at the same level is
8800 but 2 openings in the approaches
increase it to 9500 sq. feet.

The available waterway up to
girder bed level is about 11000 sq. feet.

3. During the time the Bridge was
unbuilt, Carts &c crossed below the
site of the Bridge with some diffi-
culty, from the depth of sand.

4. I am informed that for 5
or 6 days a year only, was traffic
interrupted. This however is I
think below the mark, and the
average number of days a year
on which a cart could not cross
would probably be 10.

The Current is very strong and
the sand deep and with 3' of water
running no cart could cross.

5. The nature of soil was as-
certained by driving down iron rods
into the river bed, but

6. No attempt was apparently
made to ascertain whether the
stratum of Hard Clay was really
solid. The term hard Clay however
does not correctly describe the ma-
terial in which the new Bridge
stands, as it was rather Rumbier

copy

the same as that on which some piers
of the Railway Bridge are founded.

I have the honor to be
Sir
Yours most Obedt Servt

J. D. Grant
Off Distnt Engineer
Surrey

The discover certain
 questions in part of
 the whole book.

100

Bulet 72.
Feb-28-75 Gray/76

Wm. Lloyd Garrison

Wm. Do not forget
himself

7

302 K

Gr-14.7.76-RTA 19.7.76

The Chief Engineer has con-
demned vainly ³³ kept
up more information con-
cerning the Saton Bridge
than that supplied by
the late District Engineer,
of Trinnevelly - This is
a consequence of the
system under which
all the Road & Bridge
work of the country has
been carried out un-
der orders ~~in~~ the Dist.
Dept. since the passing
of the Local Roads Act.

But reference will
hardly elicit more than
Mr. Russell has already
said; & moreover

Jillany, the Int. Engineer,
referred to by him, is at
this moment endeavor-
ing to send in his pa-
pers for penance; while
Mr. McNeil left the det.
long ago -

The practical action
to be taken in the Dis-
trict Engineer's Report
of insufficiency of wa-
terway need more
plateness of the work,
has been discussed
at some length between
the Chief Engineer & the
Chief Engineer for In-
spection - And the pre-
sent Draft affirms the
conclusions arrived

might be
dismissed
with the former as to the
additional work req^d, &
as to the incidence of
its cost - 284

with the former as to the
additional work req^d, &
as to the incidence of
its cost - 284

L. M. Walker, Major General
Sergeant D. P. W.

9.3.76



Recd. 12-1-76
9.3

Hon: R. J. Ellis C. W.
Sir W. Robinson K. C. S.
His Grace the Governor.

Public Works Dept.
Proceedings of the Madras Government
Under date the 85
Read the following

Memorandum from the
Chief Engineer for Irrigation } C. E. No 114 of 27th Aug 1876

The District Engineer,
Tinnevely, will pre-
pare Plan and esti-
mate for an addi-
tional Arch in each
wing wall of the
Saloor Bridge, and
for restoring the
damaged Bridge in
its South approach.

And submit the same
to the Local Funds
Board with a
request

It seems to me a very
unsatisfactory account of
matters if I gather the facts
rightly, and I think a Memo
of the history of this bridge
should be prepared before
the Govt is passed.

The first Bridge was con-
structed for Rs. 24,000.
It was restored for Rs. 22,000 and
is again under reconstruction
at a cost of Rs. 30,000 and now
we have a still larger outlay
proposed. Insufficient water
way has been the cause of
disaster. Further the

En 12-3-76 - R 18-3-76

En 14-7-76 - P. W. 19-7-76

request that funds may be provided for the work, with the approval of Government in the Financial Department.

The Chief Engineer for Irrigation will make a special allotment of Rs 6000 from the Agricultural Funds of 1876-77 available on the 1st April, to be laid out on permanent improvements to the Irrigation work discharging into the Satna River above the Bridge, according to the Programme and detailed estimates which he has already

District Engineer reports most unfavourably of the foundation, but the draft does not appear to provide for this, and no notice is taken of the conduct of the responsible officers who have apparently scamped the previous work - I would require further information

12/2 NOL

I entirely concur with Sir W. Robinson as to the unsatisfactory character of this work. But the evil is done. The fault has been in allowing incompetent & probably dishonest subordinates to carry on a so important work - and I fear that there is no advantage to be gained by recording the details of the failure in a report. The men who were

See separate paper
NOL

to blame are no longer in the service - I trust that under the late arrangement plans will now and keep closer scrutiny in the Chief Engineer's office than they had when the plan of this bridge was sanctioned

J.E. Finlay
Ch. Engr
Fin. Dept.

already called for. This will be in addition to such repair funds as may be required and can be spent next year; and Annual allotments will continue to be made with regularity till all necessary improvements shall have been carried out.

C.W.W.

12/3/76

Letter from the District Engineer,
Singapore, No 37 of 20 May 1906

FOR ORDERS.

It is evident that
the additional waterway proposed
of a 36 ft. Arch at each
end is essential - my
doubt is whether while
in progress - it might not
be better to add 4 arches
instead of 2. as the
proposal will still make the
way of bridge only = 7/8 of
+ section also plan when
limits are well defined
and it seems questionable
whether money spent
will not be better spent
in repairing & altering tanks
Submitted to
His Grace the Governor
with reference to Memo-
randum calling for
additional information
in connection with the
Latter Bridge and
Major J. M. B.
Secretary to Govt

3701

3701

Small tank
damaged
in 1904
not in
plan
now under
consideration

Cin-14-7-76.
L. 8th. 54 May
Recd: 10-2-76 18-3-76

Copy to
Sd. Secy

The security of which
will in a great measure
after all depend on the
can vigilance of the
people on the spot - Justice
Native officials of low
class -

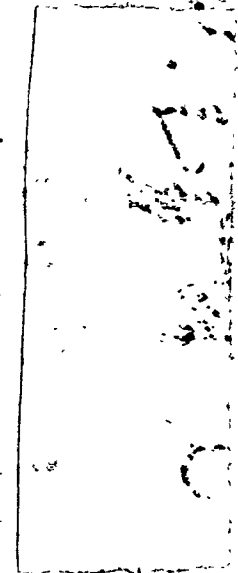
The attention of C. of M.
shd at once be drawn to
the railway bridge & the
fact of its only having
an available waterway of
= 11,500 to pass the
water of a river going
a section = 17232
+ for the road bridge
will provide = 13760

Should
It seems to me that the
N.W. should provide

a waterway not less
than the road bridge

That it should be
so constructed as to
be safe from such
accidents as breaking
of tanks over

29/5



Cin
of
air
Cin 7-2-26

FOR ORDERS.

Ch 3701

Tinnevely

No 1822

Public Works Department.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

UNDER date the 19 July/76.

Read the following:—

From the District Eng. Tinnevely No 94 dated 4th Sept/74

No. 162 25th Jan/75

Chief Eng's Memorandum 142 5th Feb.

From the District Eng. Tinnevely 191 17th March.

No 15 Chief Eng's Memorandum 15th 6th May not date

Memo by the Chief Eng for Irrigation 15th 22nd do not date

From the District Eng. Tinnevely 55 2nd Aug. not date

Memo by the Chief Eng for Irrigation 910 13th do not date

No 1 Chief Eng's Memorandum 103 25th Jan/76

Memo by the Chief Eng for Irrigation 114 27th do not date

No 11 Chief Eng's Memorandum 510 20th March print

From the District Eng. Tinnevely 37 20th May print

No. 1022

Public Works Department.

PROCEEDINGS of the MADRAS GOVERNMENT.

Under date the 14th July 1876

Read the following

From

The Chief Engineer (No. 1114 of 27th Jan 1876)
District Engineer Tirunelveli (No. 37 of 20th May 1876)

B.C. 117

His Excellency the
Governor in Council on the
whole approves of the proposals
of the District Engineer of
Tirunelveli, being carried out,
as the minimum of additional
work required to provide
sufficient waterway for the
floods of the Tamar River.
The District Engineer will
prepare Plans and Estimates
accordingly for submission to
the Local Board.

J. R.

The

3701
G. 3101
CH.
Govt. of 1876 Madras.
PUBLIC WORKS.



To
The N. B. Sinnerly

Dated
Issued
Recd
Encl.

G. O. 19th July 1876, No. 1822

Nos. 302/3

Satta or Bridge, Sinnerly
Of passing order on
Papers in connection with
certain portions of the bridge
for providing sufficient
waterway and securing
the foundations of the

but not to be
used for any other
purpose