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MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No. 2635-36 Press
B.P. No. Mis.—

Dated 30-9-1876 —195—.

Not to be folded or roughly handled

PUBLIC WORKS DEPARTMENT,

No. 557. FORT ST. GEORGE, 30*th September* 1876.

No. 2,636.

FROM

MAJOR-GENERAL G. W. WALKER, R.E.,

Secretary to the Government of Madras,

Public Works Department,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,

Public Works Department.

RAILWAY, No. 62.

SIR,—I am directed by His Grace the Governor in Council to forward herewith revised estimates for the two sections of the South Indian Railway between Madras and Tanjore.

2. In your letter No. 306 G.R., dated 25th February 1873, the sanction of the Government of India was communicated to an outlay of Rupees 69,10,522 for the section of the line between Madras and Cuddalore. This was subsequently increased* by Rupees 83,382 on account of Establishment, thus raising the total sanction to Rupees 69,93,904. The estimates now submitted for this section amount to Rupees 93,39,394, or Rupees 23,45,490 in excess of the existing sanctions. The original estimate for the Cuddalore-Tanjore section amounted to Rupees 50,31,516, while that now submitted is Rupees 55,94,824, exhibiting an excess of Rupees 5,63,308. The aggregate of the existing sanctions is therefore 120,25,420, as against revised estimates amounting to Rupees 149,34,218. From the latter sum, however, Rupees 76,320 have to be deducted on account of telegraphs, leaving Rupees 148,57,898, or a net excess of Rupees 28,32,478 as the amount now requiring sanction.

* Letter No. 1,200 G.R., dated 12th July 1873.

3. The causes of the excess are dealt with in detail in the Note by the Officiating Consulting Engineer which accompanies the estimates; and on the whole are such as could not, in the opinion of His Grace the Governor in Council, be foreseen with certainty when the original estimates were framed. The present estimates make liberal allowance for all contingencies likely to arise, and there is little probability of their being exceeded. I am to recommend them for the sanction of the Government of India.

I have the honor to be,

Sir,

Your most obedient servant,

Major-General, R.E.,

Secretary to Government.

Exd. E. C. Shunker.

Spare Copies

Note

Madras - Cuddalore Section

The original sanctioned estimate for the original estimate was Rs. 69,9522 being the estimate passed by the Consulting Engineer Rs. 68,26,180 - increased by Rs. 15000 for Saint Thomas Mount Station - Paint and by Rs. 65,000 for Railway Staff with Rs. 5342 additional for the Adyar Bridge.

2 Inv G.O. No. 1939 dated 1st August 1873 Rs. 63382 were subsequently sanctioned for additional engineering establishment making the total sanction up to date Rs. 69,29,904. The following summary represents the modifications of the main heads

heads of the sanctioned estimate for the purpose of comparison with the revised estimate now submitted.

Main heads	Consulting Engineer's estimate	Extra sanctions	Sanction to date	Share of contingencies	Redistribution of column 5.
I. Preliminary	361.000	.	361.000	.	361.000
III. Construction	1592.460	5342	1597.802	7.890	1677.692
V. Station & Building	2206.870	.	2206.870	110.343	2317.213
VI. Telegraph.	843.320	15.000	858.320	42.916	901.236
VII. Plant	.	.	.	.	.
VIII. Rolling stock	211.700	.	211.700	.	211.700
IX. Maintenance	1014.000	14.000	1028.000	.	1028.000
X. Establishment	55.080	.	55.080	.	55.080
XI. Contingencies	556.750	8382	640.132	50.000	690.132
	295.000		295.000	23.449	11.851
	6826.180		6993.904		6993.904

In the sanctioned estimate 5 per cent "contingencies" on works was entered under main head XI "Contingencies", but in the redistribution above shown

5 per cent has been added to the sanctioned amounts under heads III, IV, V, and withdrawn from head XI to facilitate comparison with the revised estimate in which the same course was followed.

Proceeding now to compare the two estimates in detail, it will be seen that the revised exceeds the original estimate by Rs. 23,15,490 equivalent to 33.5 per cent on the sanctioned amount. The subjoined table shows the distribution of the excess under main heads.

Heading	Sanctioned estimate	Revised estimate		Difference
I. Preliminary expenses	3,61,000	1,28,000	−	2,33,000
II. Land.				
III. Construction of line	16,77,692	26,07,223	+	9,29,531
1. Earthworks	4,10,928	4,25,872	+	14,944
2. Bridgework				
(a) Minor bridges culverts &c.	2,21,550	5,28,929	+	3,07,379
(b) Larger bridges	9,06,615	13,56,925	+	4,50,310
4. Level crossings	43,785	1,31,717	+	87,932
5. Fencing	88,168	1,58,280	+	70,112
Temporary telegraphs	6,646	5,500	−	1,146
IV. Ballast & Permanent Way	23,17,213	28,84,673	+	5,67,460
1. Ballasting	1,58,056	1,81,711	+	23,655
2. Permanent way	21,59,157	27,02,962	+	5,43,805
V. Stations & Buildings	2,01,236	10,87,068	+	1,85,832
Terminal Works	6,33,360	5,63,101	−	70,259
1. Stations & Offices	1,34,715	2,98,695	+	1,63,980
2. Workshops store buildings &c.	14,122	36,143	+	22,021
3. Staff quarters	71,915	81,598	+	9,683
4. Station machinery	47,124	1,07,531	+	60,407
VI. Electric Telegraph		66,708	+	66,708
Madras – Tiruvannamalai		40,167	+	40,167
Tiruvannamalai – Cuddalore		26,541	+	26,541
VII. Plant	2,11,700	2,97,158	+	86,458
1. Engineering	60,000	1,70,603	+	1,10,603
2. Locomotive and } 3. Carriage and Wagons }	1,20,000	45,210	−	74,790
4. Station & office furniture	31,700	81,345	+	49,645
VIII. Rolling stock	7,68,000	9,17,219	+	1,49,219
IX. Maintenance	55,080	1,53,600	+	98,520
X. Establishment	6,90,132	11,40,710	+	4,50,578
1. Direction	80,000			59,852
2. Engineering				4,16,929
3. Locomotive	97,300	20,741	−	76,559
4. Telegraph		5,926	+	5,926
5. Stores	25,200	17,778	−	7,422
6. Audit and Account		29,630	+	29,630
7. Medical		22,222	+	22,222
XI. Contingencies	11,851	57,033	+	45,182
1. Direction	10,000	6,993	−	3,007
2. Engineering		45,228	+	45,228
3. Locomotive	1,851	1,037	−	814
4. Telegraph		295	+	295
5. Stores		888	+	888
6. Audit and Account		1,481	+	1,481
7. Medical		1,111	+	1,111
Total	69,93,934	93,39,394	+	23,45,490

I. Preliminary Expenses

4

The original estimate provided Rs 3,61,000 based on actual expenditure to date and the probable requirements for the then current financial year. A portion of this outlay has since been transferred to establishment

-tablishment, the amount remain-
-ing under head Preliminary
expenses in the revised estimate
being Rs. 1,26,000. or a rate of
Rs. 1,000 per mile. The provi-
-sion under this head will
be further considered when
dealing with the estimate for
Establishment X.

II. Land.

This item calls for no 5.
comment.

III. Construction of Line. 6.

1. Earthwork. Under this head
there is an excess of Rs. 14,94,4.
but it must be noted that
whereas the original estimate
provided for a ruling gradient
of

of 1 in 140, that now submitted is
based on a ruling gradient of 1 in
200. The original estimate provides 12,472
cubic yards per mile, an in-
-crease of 44 per cent; but exp-
-erience has shown that the
average rate could be very ma-
-terially reduced and this has
been done, the general rate now
allowed being 2 annas 9 pies as
against 4 annas (excluding turfing)
in the original estimate.

Note.
The estimate for the Southern ex-
-tension reached 18,135 cubic yards per mile.

2. Bridge work. It is under
this head that will be found
the most important difference
between the estimates under
review, and there is no reason

to

to regret it. The season of 1874, subsequent to the submission of the original estimate, was one of the severest on record, and enabled the Engineering staff to gauge the provision of waterway throughout by standards till then unknown. This has resulted in an increase of 1333½ lineal feet of waterway giving a total of 66 lineal feet as compared with 70.6 lineal feet per mile of line; and at once accounting for Rs. 314,498 of the increase. The annexed statement illustrates this.

8. It will be observed that the rate sanctioned at the Consulting Engineer's suggestion in the original estimate is still allowed

	Estimate	Bridges and Culverts	Rail-way Lineal feet	Cost	Cost per lineal foot	Cost on all bridges per lineal foot	Rail-way lineal feet per mile	Rail-way lineal feet per mile
Original		220½	24,500	190.4	8.65	8.10	120	70.6
Revised		2736	49,945	185.8	8.40	13.49	130	124.2
Excess in favour of Revised		2515½	25,445	139.6	5.00	5.39	215	53.6

allowed for all minor works; Rs. 15 and 12 have however been entered for large bridges, and Rs. 8 for stations and culverts; but experience gained hitherto affords no good reason why Rs. 8 should not be adopted as the average rate in all bridge work. The quantity of masonry now provided per lineal foot of waterway will be seen from the statements attached to be largely in excess of that originally allowed for. This was to some extent feared as will be seen from the last portion of paragraph 8 of the Office letter No. 533 dated 4th October 1872, and it was with the

the greatest reluctance that the estimate based on average depths of foundation was accepted, although the preliminary expenditure of nearly three lacs and an investigation extending over two years might be held to justify the reception of such an estimate unchallenged.

9. In paragraph 6 of their letter No. 306 S. P. dated 25th February 1893, the Government of India deals with this question and although the comparison there instituted between the provision on the Southern

Southern extension and that under review is open to correction the inference drawn was undoubtedly correct.

It will be seen from the statement in paragraph 8 that the average cost per lineal foot of waterway in large and small bridges was estimated at Rs. 118 or adding 5 per cent. for contingencies Rs. 1242 instead of Rs. 86 as stated in the letter alluded to. In the revised estimate now submitted this figure stands at Rs. 170.9. The revised estimate for the Southern Extension gave Rs. 159.7 per lineal foot, but a saving under this head was anticipated and has, it is believed, been effected. It will

be

be seen further on that the cost of the Palar bridge being an estimate by the Government of India estimated at Rs. 160 or with 5 per cent for contingencies Rs. 168 per lineal foot, is now estimated, on a different design (when the foundations are well forward) at Rs. 180 per lineal foot, and it should it is thought, be constructed well within such an estimate.

(a) Minor bridges culverts &c:- The following table shows the increase in the quantity of the masonry now estimated as necessary for minor bridges and culverts in comparison with that originally provided. —

The provision for the Southern Extension is also shewn.

Estimate	Total quantity of masonry cubic yds.	Lineal feet of waterway	Cubic yards per lineal foot
Original	15149	2,207½	6.86
Revised	43364	2736	15.85
Southern Extension	46538	3763	12.37

Paragraph 11.

From paragraph 17 of this office letter forwarding the original estimate, it will be seen that the average depth assumed by the Engineers in the field encouraged the hope that a hard substratum underlay the old alluvial deposits traversed by the line at a much less depth than has since been found to be the case,

and

and there was every reason to suppose that good brick earth would be found throughout; for upwards of 30 miles however, the works are nearly all of stone, and much of the foundation work was deep, difficult and costly.

(b) Large bridges. The accompanying statement shows the comparative estimates for large bridges.

The following appear to call for remarks.

2 Miles 76 Chains "The Caum"; Five 40 feet spans

The original estimate provided for four 40 feet spans and only 12' assumed average depth of foundations. The floods of 1894 however led to the addition of an extra span, and a well foundation, through the sandy bed to a hard substratum 25 to 30 feet below it, was thought necessary. ... 15'

6 Miles 50 Chains "The Adyar"; Five 66 feet spans

In this bridge the designs sent out from England provided 3 tons per span of iron-work in excess of that estimated in this country; the extra cost in masonry is due to the discovery of a tradition recording a flood 3 feet higher than that previously assumed, the piers being accordingly raised to this extent.

22 miles "Ooraiyakam" bridge

A 4th floor costing Rs. 4000 and one extra span have been provided for this bridge.

miles chs.
33-73. "Chinglepet Bridge"

Two extra spans were pro-
-vided for this bridge.

miles chs.
42-65. "Palar Bridge"; eighteen 120 span

The original design provi-
-ded iron cylinders but brick piers
have been substituted, and the iron
work as designed in England ex-
-ceeded the estimated weights by
nearly 46 per cent.

miles chs.
44-69. Eight 25 feet were substituted
for four 25 feet spans

miles chs.
45-30 & flooring costing Rs. 4000 is pro-
-vided and accounts in a great
measure for the excess.

miles chs.
49-13. "Karangaly bridge"; nine 40 feet spans.

Two extra openings were
provided. This bridge illustrates very
forcibly

forcibly the fallacy of the system
of estimating by averages, as
followed in the original estimate
and commented upon by the
office and sending it forward.
The masonry arrived at by
averaging was cubic yards 609,
while the actual quantity, al-
-though the river bed is rocky
and the masonry all above
ground, amounts to cubic yards
1503.

miles chs.
84-29. "The Pondyar"; two 100 feet spans.

It was originally in-
-tended that this bridge should
have four spans of 30 feet,
but owing to the floods of
1874 it was subsequently
increased

The quantity of masonry al-
-lowed in the bridge is 1817 -
cubic yards as against 486 in
the original estimate.

built also
97-3: The Pombay; three 30 feet spans.

The cost of this bridge has
been largely increased by an
error in construction. Two re-
-taining walls were carried be-
-tween the abutments instead of
between the wing newels; and
on the error being discovered, the
Engineer in charge was directed to
add a second set of walls to
those already built; as the walls
were very deep and the founda-
-tions sand, a large excess re-
-sulted.

increased to seven 30 feet spans
and on breaking ground, it
was resolved to substitute two
100 feet spans, a measure since
found fully justified by the
nature and depth of the sta-
-ta traversed in sinking the
piers cylinders.

85-90 The Ginger; Eleven — 30 feet spans
Two — 15 feet arches.

The increase from nine
30 feet spans to eleven 30 feet —
spans and two 15 feet arches ac-
-counts for one third of the additional
cost. The stone for this bridge
has to be brought 10 miles and
the rate for masonry is now
estimated at Rs. 15 as against
Rs. 10 in the original estimate.

The

105-2. The Panaji seventeen-foot span

The design of this bridge was altered, masonry cylinders being substituted for iron: the cost with it is thought will fall short of the present estimate.

124-15. The Guddalam eight-foot span

Brick cylinders were substituted for pile in this bridge also. The foundations have proved far more costly than could have been anticipated.

127-38. The Guddalore backwaters one 90-foot span

The same remarks apply to this bridge.

The following further additional waterways have been allowed.

- raised since the original estimate was sanctioned, in consequence of the floods of 1871:

Mileage	No.	Spans	Cost Rs
23·47	4	20	5690
42·6	4	20	13537
63·58	4	20	8517
64·45	3	25	7743
69·34	3	25	16345
96·13	2	30	12313
77·2	3	20	7571
x 84·16	3	25	16345
106·29	4	25	22487
			110548

x since reduced to one 25 feet span.

13. 4. Level crossings — It is not possible to compare closely the two estimates under this head.

The comparative provisions were

Estimates	crossings	Pairs of gates	bridges	Pairs of gates per mile	Foot paths per mile	Total crossings per mile
original	97	68	69	·53	·23	·76
Revised (...)	1439	184	108	1·43	2·00	3·43

In

In the original estimate 18'-6" gates were allowed in all cases, but in the revised estimate 24 feet gates have been substituted at the principal thoroughfares. The provision for earthwork in approaches and diversions was too small and no allowance was made for culverts over the side ditches.

5 Fencing. In the original estimate no extra provision to that allowed under the head of construction was made for a live fence, but wire fencing was provided for ¼ the distance. In the revised estimate the same proportion of wire fencing is provided for, but Rs. 400 per mile are allowed for the remainder as live fencing and in addition

addition Rs. 32951 are entered for fence walls through a portion of the town of Madras.

15. Temporary telegraph. This appears to call for no remarks.

16. IV. Ballast and Permanent way.

Estimates	Miles	Provision for new formation	Ballast provision permanent way	Loading	Laying	Unballasting	Ballast shoulder and Permanent way
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Original	138	13698	7795 837	242741	123379	158056	2317213
Revised							

The increased provision is due to the fact that several contracts were let whilst high prices prevailed in the iron market; some rails costing in England as much as £ 13. 19. 6 per ton; the rate entered in the revised estimate is based upon the average rate paid. It is to be observed

In the original estimate 13-6 gates were allowed in all cases but in the revised estimate 24 feet gates have been substituted at the principal thoroughfares. The provision for earthwork in approaches and diversions was too small and no allowance was made for culverts over the side ditches.

5 Fencing. In the original estimate no extra provision to that allowed under the head of construction was made for a live fence, but wire fencing was provided for the distance. In the revised estimate the same proportion of wire fencing is provided for, but Rs. 400 per mile are allowed for the remainder as live fencing and in addition

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15. Temporary telegraphs. This appears to call for no remarks.

16. IV. Ballast and Permanent way.

Estimates	Miles	Provision per mile	Total provision permanent way	Leading	Laying	Ballasting	Total ballast and permanent way
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Original	138	13498	1863237	242741	123379	153056	2317213
Revised							

The increased provision is due to the fact that several contracts were let whilst high prices prevailed in the iron market; some rails costing in England as much as £ 13. 19. 6 per ton; the rate entered in the revised estimate is based upon the average rate paid. It is to be

observed

observed also that the rate of exchange allowed in converting the estimated cost in England into Rupees for the purpose of estimating was "2 shillings" whilst in the revised estimate the rate is 1 shilling 4 pence per rupee.

V. Stations and Buildings

Terminal Station

17. The amount now entered falls short of that in original estimate by Rs. 70,259. The comparative figures under sub-heads being as follows

Estimate	Stations and offices	Workshop and stores	Staff quarters	Station machinery	Total
Original	283,424	292,709	31,443	25,784	633,360
Revised					

Stations and Offices

18. The Station house was designed

by the Government Consulting Architect and is estimated at the same sum nearly as in the original estimate. This work is however in abeyance pending a decision as to the site.

The excess is due to the cost of the compound walls at the goods and passenger stations and to the provision of a temporary passenger station for present purposes.

Workshops and Stores

19. There is a large saving in the "Dressing shop" and "Saw shed" being omitted in the present estimate, which provides for

1. An Engine shed	200 x 81
2. Coal shop	68 x 40
3. Smiths' shop	50 x 40

observed also that the rate of exchange adopted in converting the estimated cost in England into Rupees for the purpose of estimating was "2" shillings 4 Whilst in the revised estimate the rate is 1 shilling 4 pence per rupee.

V. Stations and Buildings

Terminal Stations

17. The amount now entered falls short of that in original estimate by Rs. 70,259. The comparative figures under sub-heads being as follows

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Original	283,424	292,709	31,443	25,784	
Revised					633,360

Stations and Offices

18. The Station house was designed by the Government Consulting Architect and is estimated at the same sum nearly as in the original estimate. This work is however in abeyance pending a decision as to the site.

The excess is due to the cost of the compound walls at the goods and passenger stations and to the provision of a temporary passenger station for present purposes.

Workshops and Stores

19. Here there is a large saving the "Breeding shop" and "Saw sheds" being omitted in the present estimate, which provides for

1. An Engine shed 200 x 81
2. Coal shop 68 x 40
3. Smiths' shop. 50 x 40

4. Locomotive Superintendents office

5. Locomotive Stores 24'-6" x 16'-9"

6. A boiler house and chimney stack

Staff Quarters

20. The provision here is for two double bungalows for Engine drivers.

21. Stations and Buildings

The accompanying statement shows in detail the items under which the revised exceeds the original estimate; it will be seen at a glance that the extent and description of accommodation provided in the two estimates differ so entirely that any comparison between the estimated amounts can only

lead to misconception.

22. It was the intention of this office at the time the original estimate was submitted to permit only the provision of the most limited accommodation and when the estimate received the general concurrence of the Chief Engineer of the South Indian Railway Company it was concluded that this principle among others was conceded, when however the designs reached this office, it was found that the scale of provision was based upon, indeed in excess of, that sanctioned for the Southern Extension, but the submission of the plans had been so delayed that

that further discussion was impossible, except with a fuller knowledge of the requirements in opening that would have far subscribed any possible saving that might have resulted. At the same time it must be allowed that the provision made in the original estimate would have been quite inadequate to meet the demands of the traffic department and must, at no distant date, have been supplemented by extensive additions, which now find a place in the revised estimates.

The recent orders by the Government of India as regards the comfort of native passengers have moreover given encouragement to

to a much greater outlay on station premises than was ever contemplated four years ago, and although in the opinion of this office undesirable outlay has in some instances been incurred, it is not considered that the provision of accommodation generally is in excess of what, it may reasonably be hoped, will be found necessary at no very distant date, while the rates, though apparently high for the class of work employed, have in many cases effected a corresponding saving in the bridge work estimates to which the second class material used in the station buildings was originally and must have remained, debited. It is hoped that some of the expenditure

entered

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The recent orders for the Government of India to economise the comfort of native servants have materially [illegible] to

19

to a much greater outlay on station premises than was ever contemplated few years ago, and although in the opinion of this office undesirable outlay has in some instances been incurred, it is not considered that the provision of accommodation ge- -nerally is in excess of what, it may reasonably be hoped, will be found necessary at no very distant date, while the rates, though apparently high for the class of work employed, have in many cases effected a corresponding saving in the bridge- -work estimates to which the second- class material used in the station buildings was originally and must have remained, debited. It is hoped that some of the expenditure

entered

entered for compound walls and approaches may yet be dispensed with.

23. It will be observed that the provision of accommodation at Villupuram is on a much larger scale than was originally intended, with a view to the junction arrangements for the Pondicherry branch.

24. In illustration of the above remarks the Madranta Station may be taken as a type.

As per original Estimate Rs.	Madranta Station.	As per revised Estimate Rs.
850	Ticket Office	
280	Latrine	
—	Waiting sheds	
705	Platform	
1,600	Ist class	
725	Approaches	
4,160		

As per original Estimate Rs.	As per revised Estimate Rs.	
		Ticket Office
25 . 2 . 9		Earthwork
373 . 0 . 0		Masonry
45 . 3 . 3		Floor
264 . 5 . 1		Roof
130 . 8 . 0		Doors & Windows
		Plastering and Carriage Street
11 . 12 . 11.		Contingencies
850 . 0 . 0		

Latrine

224	Masonry	
50	Floor	
6	Sundries	
280		

Waiting sheds

entered for compound walls and approaches may get be dispensed with.

23. It will be observed that the provision of accommodation at Villupuram is on a much larger scale than was originally intended, with a view to the junction arrangements for the Pondicherry branch.

24. In illustration of the above remarks the Madrasta Estimate may be taken as a type.

As per original Estimate Rs.	Madrasta Estimate.	As per revised Estimate Rs.
850	Ticket Office	
280	Latrine	
—	Waiting shed	
705	Platform	
1,600	Fencing	
725	Approaches	
4,160		

As per original Estimate Rs.		As per revised Estimate Rs.
	Ticket Office	24
25.2.9	Earthwork	
393.0.0	Masonry	
45.3.3	Floor	
264.5.1	Roof	
133.8.0	Doors & Windows	
	Plastering and Carriage	
11.12.11.	Contingencies	
850.0.0		

Latrine

224	Masonry	
50	Floor	
6	Sundries	
280		

Waiting shed

As per original Estimate

	Platform	As per revised Estimate
142	Excavation	
522	Masonry	
	Roofing	
	Earth	
39	Metaling	
	Palings	
	Gate	
8	Sundries	
705		

	Roadway	
1600		

	Approaches	
450	Earthworks	
75	Metaling	
200	Gates	
	Sundries	
725		

25. The accompanying statement further illustrates the extent and description of accommodation provided in the two estimates. The principal points in which the estimates differ are the following.

Appendix Table D

26. The original estimates contemplated all the buildings being off the banks, with basements regulated by sanitary considerations only. They provided no palings to the platforms only a mud bank to demarcate the

the compound; and but very small outlay on the station approaches, the platform walls had a much smaller section than is now proposed, and it was not intended to cope them. Only half the thickness of metalling now given was allowed for. In fact the accommodation which it is now intended to give at Vandalur and Guindy with the addition of small inexpensive buildings and a branch siding was thought ample for most of the other small stations.

27. 3 Workshop store Buildings @ 2½ The revised estimate provides Rs 36,143 as compared with Rs 14,122 or an excess of Rs 22,021, but a comparison of the two designs for engine sheds shows an excess provision of Rs 19,112 under this item alone.

28. 3 Staff Quarters — Only Rs 15,000 were allowed in the sanctioned estimate for the drivers quarters and this very limited provision was added in this office; these at Kondalur/Waltair are now estimated to cost Rs 48,498 but a considerable saving in "station masters houses" and temporary quarters for Engineering staff" reduces the net

increase

increase provided for in the Revised
Estimate to £9,683

at 4 Station Machinery — the estimates 29.
for provide as follows:-

Sanctioned		Revised
300	Weck	
150	Staging for ditto	
1,000	Tank houses	
200	Piping	
580	Water cranes	
140	Steel stage	
230	Ash pit	
5,000	Turntable	
400	Semaphore	
120	Buffer stops	
120	Points each	
	Well house	

The above statement shows that some of the station machinery cannot now be purchased for the amount allowed in the original estimate. The less

23

expensive arrangement for lifting water and small sized well recommended by this office did not meet the approval of the Railway Company's officers and were not adopted. The additional expenditure for points, buffer stops and semaphores has been allowed for in deference to the views of the Traffic Department, by whom the arrangements of sidings and lay layers upon which this depends, were settled.

30. For principal stations a platform and two distance signals have in the revised estimate been provided. For the minor stations, two distance signals have been substituted

for

for one double armed platform signal and a through siding and a long cattle loge for goods have been provided. Cargo wells roofed in with pumps are estimated for at all watering stations.

II Telegraphs.

31. Under the sanction conveyed in G. O. No 2125 dated 3rd August 1874 a permanent line of single wire has been erected between Madras and Pudevanum and provision has been made in the revised estimate for the substitution of permanent posts in the present temporary line between Pudevanum and Chittoor for the rest

however is to be erected by the Telegraph Department, the estimate may be reduced to the extent of Rs 26,541 under this head. VI 33

III Plant.

32. The amount allowed for Engineering Plant in the original estimate, although largely increased by this office, would seem to have been much under-estimated, that allowed for Locomotive Plant being in excess of the requirements.

The excess provision under head "platform and office furniture" is due to some extent to the increased scale of provision in the Station accommodation

for one double armed platform signal and a through siding and a long Cargo shed for goods have been provided. All is well roofed in with pumps are estimated for at all watering stations

VII Telegraph

31. Under the sanctioned conveyed in G. O. No 2180 dated 3rd August 1874 a permanent line of single wire has been erected between Madras and Pudukottai and provision has been made in the revised estimate for the substitution of permanent poles on the present temporary line between Pudukottai and Trichinopoly

Vide

however is to be erected by the Telegraph Department, the estimate may be reduced to the extent of Rs 26,541 under this head.

VIII Plant.

32. The amount allowed for Engineering Plant in the original estimate, although largely increased by this office, would seem to have been much under-estimated; that allowed for Locomotive Plant being in excess of the requirements.

The excess provision under head "Station and office furniture" is due to some extent to the increased scale of provision in the Station

Accommodation

for accommodation

an

VIII Rolling Stock

33. Over the original (

leliminate Rs. 000 per mile were allowed

m under this head; in the Revised Esti

mate a rate of Rs. 7,166 per mile is allowed

31 This figure appears to be based upon

con mileage rate upon the Revised Estimates

An for the whole South Indian system

vi now before the Government of India

hi

IX Maintenance

pro 34. The provision for

re the rate of Rs. 850 per mile per month

of for two years

ten

X Establishment

an 35. Under this

the original Estimate Rs. 90,132 were

provided, as for Preliminary Expenses

and Establishment together.

	Original	Revised
Preliminary Expenses	61,000	1,28,000
Establishment	90,132	11,40,710
	10,51,132	12,68,710
		10,51,132
showing an excess of		2,17,578

Under the remaining

sub heads in the original Estimate

the provision amounted to Rs. 2,02,000

the Revised Estimate provides Rs. 36,149

Rs. 33,851

The figure in the Revised Estimate was arrived at by estimating the probable expenditure on both the Extensions and dividing it in proportion to the mileage.

Under the sub-head "Engineering" the Original Estimate provided £4,84,632 this added to £2,33,000 since transferred from the sum of £3,61,000 included under Preliminary Expenses gives a total of £7,20,632 as compared with the provision in the Revised Estimate £9,04,567. The excess £1,83,935 is no doubt due to the additional year required in the construc-

contingencies

27

Note.

Cuddalore – Tirupur Section

37 the sum originally sanctioned

G.O. No 457

26

XI Contingencies

36. three lacs have been calculated at 5 per cent on the amounts provided under head X – Establishment.

– increased to Rs 1000 per mile, as against Rs 500 per mile sanctioned.

III Construction of Line

39 All under this head that the large difference appears

(1) Earthwork

The increase has arisen to upwards

The figure in the revised estimate was arrived at by estimating the probable expenditure on each the several

Engr

P.W.D. 19 SEP 76

praise

£ 2,3.

sum

Prelim

£ 7,20,000 ...

provision in the revised estimate £ 9,04,567. The excess £ 1,83,029 is due double due to the additional year required in the construction

contingencies

Note.

Cuddalore – Tanjore Section

37 The sum originally sanctioned for this section was Rs 50,31,516 the revised estimate now submitted amounts to Rs 53,94,824 being an increase of Rs 5,63,308 or 11.2 per cent.

G.O. No 457 dated 17th Feby 1876.

The accompanying statement gives a comparison of the two estimates arranged by subheads.

I Preliminary Expenses.

38 The amount under this head is now entered at Rs 1000 per mile, as against Rs 500 per mile sanctioned.

III Construction of Line

39 It is under this heads that the large difference appears.

(1) Earthwork

The increase here amounts to upwards

The figure in the Revised Estimate was arrived at by estimating the probable expenditure on each of the Sections

Engineering & Establishment

Rs 2,35,000

Rolling Stock

Preliminary Expenses

Rs 7,20,000

Provision in the Revised Estimate Rs 9,04,567. The excess, Rs 1,83,029 is no doubt due to the additional year accepted in the construction

contingencies

P.W.D. 19 SEP 76 N.S.

27

Note.

Cuddalore – Sangam Section

G.O. No 457 dated 17th Feby 1876.

37 The sum originally sanctioned for this Section was Rs 50,31,516 the Revised Estimate now submitted amounts to Rs 53,94,824 being an increase of Rs 3,63,308 or 11.2 per cent.

The accompanying statement gives a comparison of the two Estimates arranged by subheads.

I Preliminary Expenses.

38 The amount under this head is now entered at Rs 1000 per mile, as against Rs 500 per mile sanctioned.

III Construction of Line

39 It is under this head that the large difference appears.

(1) Earthwork

The increase has amounted to upwards

Statement of Waterway in Minor Bridges Cuddalore - Tanjore section.

Estimate	Minor Bridges & Culverts			Large Bridges			Total		
	Lineal feet	Estimated cost	Per lineal foot	Lineal feet	Estimated cost	Per lineal foot	Lineal feet	Lineal feet per mile	Average cost per lineal foot
Original	1623	360.917	222.4	4941	749.886	151.8	6564	72.9	169.2
Revised	1912	[illegible]	222.6	5315	1154.914	217.3	6925	[illegible]	222.6

(2) Bridges

40. The following are the principal changes in the waterway and estimates since the original estimate was sanctioned:-

1. The original estimate provided for 22 openings of 20 feet each in the Vellar bridge, but the number has been increased to 30 openings of 20 feet each, the width of the river having been found to require this increase.

2. The original estimate provided for 10 openings of 20 feet each in the Coleroon bridge, but the number has been increased to 12 openings of 20 feet each, the width of the river having been found to require this increase.

3. The original estimate provided for 10 openings of 20 feet each in the Vellar bridge, but the number has been increased to 12 openings of 20 feet each, the width of the river having been found to require this increase.

4. The original estimate provided for 10 openings of 20 feet each in the Coleroon bridge, but the number has been increased to 12 openings of 20 feet each, the width of the river having been found to require this increase.

5. The original estimate provided for 10 openings of 20 feet each in the Vellar bridge, but the number has been increased to 12 openings of 20 feet each, the width of the river having been found to require this increase.

6. The original estimate provided for 10 openings of 20 feet each in the Coleroon bridge, but the number has been increased to 12 openings of 20 feet each, the width of the river having been found to require this increase.

7. As against 30 openings of 20 feet each in the Vellar bridge, 30 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

8. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

9. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

10. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

11. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

12. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

13. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

14. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

15. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

16. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

17. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

18. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

19. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

20. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

21. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

22. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

23. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

24. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

25. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

26. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

27. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

28. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

29. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

30. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

31. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

32. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

33. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

34. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

35. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

36. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

37. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

38. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

39. As against 10 openings of 20 feet each in the Vellar bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

40. As against 10 openings of 20 feet each in the Coleroon bridge, 10 openings of 20 feet each have been provided, the width of the river having been found to require this increase.

(a) Minor Bridges

38

41 The following table shows in comparison the provisions of masonry in the original and revised estimates. It will be observed that the allowance made is very high being 19.7 cubic yards per lineal foot of gateway as against 15.85 for the Madras-Conjeeveram section. The nature of the country traversed fully accounts for this. The rate has been reduced from 24 to 9 Rs per cubic yard.

Estimate	Masonry C. Yards	Gateway Openings	C. Yards per lineal foot	
Original	20,616	1823	7.6	
Revised				

42. The most important feature in the revised estimate is the substitution of 150 feet for 125 3/4 feet spans in the Coleroon and 150 feet for 100 feet spans at the Paravanaar and Vellaur. As estimated the cost of the piers exceeds that of the new work but the almost certain saving that may be looked for in the former will probably counterbalance the cost and justify the spans adopted. It may be open to question whether larger spans might not have been used with advantage in some of the bridges in the Tanjore Delta where they have been found necessary to adopt well foundations but any saving that may be effected in the piers will in like manner materially affect the question.

43. There is in the Madras Cuddalore section the rate entered for sinking large masonry cylinders seems very liberal but there has been so little work of the kind executed hitherto except by this Company and the nature of the work is so uncertain that it seems desirable to enter an outside estimate & work of a similar nature in other districts may perhaps furnish some standard by which to gauge the rates now entered.

44. It will be noted that the rate for iron is now entered at £200 per tone as against £243-5-0 on the Madras-Cuddalore section; a considerable decrease on that allowed in the original estimate

45. There is a considerable saving in iron in the 50 feet spans in the revised estimate

based on the yardage contained in the
Southern Extension allowed 13.00 lins
per span, three now designed at 16 lins
6 ins per span.

4. Level Crossings. 46.

The original estimate gave — 60
— provided — yards — 1

The increase in the estimated cost is
accounted for by the enlargement from
cross to cantilever [illegible] for
girder, the [illegible] and
metalling roads

5. Fencing.

47 — The original estimate provided
wire for half the line each side of the gates
and one fourth of the remainder, the
revised estimate 1/4 th has been allowed
throughout, but the addition of £100 per
mile for the live fencing about equalises
the two estimates.

6. Temporary Telegraph.

48. Appears to call for no remarks

here

Ballast and Permanent Way.

49. There is a large increase under the
head of ballast due to the provision
of 10 inches below the underside
of the sleeper as compared with 7
inches allowed in all other estimates
this gives 1.66 cubic yards per yard
run against 1.13 allowed in all for-
mer estimates.

In the permanent way there is a large
saving owing to a fall in the price
of iron the rate now entered being
£9 per yard run as against £13 in the
original estimate.

Stations and Buildings.

50. Under this head there is an increase of £1691 on the
proposed

proposal to omit the stations partly accounts for this, and the recommended for which the 40000 are allowed for "Locomotive watchers" has been provided for in the estimate for the Main Guildford section

The number of stations now proposed are an average distance of 7 miles apart and the estimated cost £3130 per mile cannot be regarded as excessive when the character and class of the accommodation considered.

There is little doubt that all these will be a few cases provided electric telegraph

VI Electric Telegraph

51. The temporary line now in use has provided for under construction of line. The cost of erecting permanent posts and

and wire is estimated at 49.779 £.

such as the work will be undertaken by Government, the estimates may be reduced by this amount. 41

VII Plant.

52. No communication called for.

VIII Rolling Stock

53. The amount entered is at the mileage rate of £9,166 the same as for the other sections

54. IX Maintenance

An allowance of £50 per mile per annum for ten years is entered

55. X Establishment

The increase, as in the other sections is accounted for by the length of line the line will have been under con- struction

56. XI Contingencies

These have been estimated at

proposal to erect two stations partly accounts for this, and the accommodation for which the sum of Rs 1000 was allowed for "locomotive turnshops" has been provided for in the estimate for the Madras Guddalore section

The number of stations now proposed and an average distance of 7 miles apart and the estimated cost of Rs 3,130 per mile cannot be regarded as excessive when the character of the accommodation considered.

One is liable doubt that all these will be a few some provide stations eventually opened.

VI Electric Telegraph

51. The temporary line sum of 1000 has provided for under construction of line. The cost of erecting permanent posts and

and wire is estimated at 49.779 Rs. but as the work will be undertaken by Government, the estimates may be reduced by this amount. 41

VII Plant.

52. No commencements called for.

VIII Rolling Stock

53. The amount entered is at the mileage rate of Rs 166 the same as for the other sections

54. IX Maintenance

An allowance of Rs 50 per mile per month for two years is entered

55 X Establishment

The increase, as in the other sections is recommended for by the length of line. The line will have been under con-

struction

56. XI Contingencies

These have been estimated at

at 5 per cent upon estabd. amount"

P. W. D.
19 SEP 76.

Madras
15 Septr
1876

C. J. Smith Majr R.E.

Offg: Consg: Engr: for Railways

RAILWAY DEPARTMENT.

CONSULTING ENGINEER'S OFFICE,

Madras, 15 Septr 1876

No. 1456A

From

MAJOR C. J. SMITH, R. E.,
Offg. Consulting Engineer for Railways,

To

MAJOR-GENERAL G. W. WALKER, R.E.,
Secretary to Government,
Public Works Department,
Fort Saint George.

SIR,

I have the honor to submit herewith revised estimates for the line of Railway between Negapatam and Tanjore. The two sections, Negapatam to Coodalore, and Coodalore to Tanjore, have hitherto been dealt with separately, and to facilitate reference I propose to case the whole on the present occasion

2. The original estimate for the Negapatam-Coodalore section received

at 5 per cent upon established Amount"

P. W. D.
19 SEP 76.

Madras
15 Septr
1876

C. J. Smith Majr R.E.
Offg: Consg: Engr: for Railways

Railway Department.

Consulting Engineer's Office,
Madras, 15th Septr 1876

No. 1456A

From

Major C. J. SMITH, R. E.,
Offg. Consulting Engineer for Railways,

To

Major-General G. W. WALKER, R.E.,
Secretary to Government,
Public Works Department,
Fort Saint George.

Sir,

I have the honor to submit the accompanied estimates for the line between Madras and Arconum. The two sections, Madras to Conjeveram, and Conjeveram to Arconum, have hitherto been treated separately, and to facilitate reference, I propose to continue the same in the present case.

2. The original estimated for the Madras-Conjeveram section

to secure the sanction of the Govt
and of which a copy is Enc. No
806 dated 25th February 1873, which was
communicated to the Chief Engr
dated 26th March 1873, and the fur-
ther duty Engineer has been directed
to obtain from the Asst. and Chief
Engineers of the Companies and
Superintendent of their Southern Extension
as to the adequacy of the revised
estimates to meet the cost of the
proposed enhanced rates and
to test from the Chief Engineers
as shall not already be done
as to the adequacy of the revised
and estimates of the bridges on
the Northern Extension which
are excluded from the Govt
of India sanction.

with the sanctioned for the
Southern Extension"

3. These reports from the Chief Engineers of the "Great Southern" and "Carnatic" Railway companies have dealt with in G.O. No 2224 dated 8th September 1873, and with their order No 2654 dated 30th October 1873, the Madras Government communicated letter No 1728 G.R. dated 7th October, 1873, from the Government of India confirming their recommendation that pending the preparation of revised estimates for the bridges and for those portions of the line affected by altered gradients, no increased rates need be made to the sanction already accorded.

4.

4. The first instalment of these revised estimates reached this office in January 1875, but those for the stations and buildings were first sent forward in November 1875; further revisions were received in February 1876 and it was not until 4th September 1876 that the whole were received in a sufficiently complete form to be sent forward for sanction

5. The respective notes on the two sections explain in detail the several items of excess or saving in the estimates now submitted as compared with those sanctioned. As regards the sufficiency of the former, I would remark that while many considerable

liable.

economies may be effected in the future and all such expenditure as to details including minor excesses over the sanctioned estimates as appear to have been provided for, the general rates and quantities remain as originally sanctioned. The estimates may in fact be regarded as a "bill for all work already done and as a liberal estimate for the remainder as the rock of even a more unfavorable circumstances must therefore be much less than with the original estimate. A very considerable saving has, it is understood, been effected on the estimates for the Southern extension, and there ought certainly to be a saving in those herewith submitted.

Vide memo. 4 Dec. 1876

6. The accompanying tabular form shows the combined results of

of the estimates for the two sections taken together, and for the sake of comparison the estimate for the Southern extension has been shewn. The total sanction up to date for the two sections amounts to Rs 120,25,420 the revised estimates together aggregate Rs 149,34,218 from which must be deducted the estimated cost of erecting the Telegraph viz Rs 5,76,320, leaving Rs 28,32,478 as the sum requiring the sanction of the Government of India for the completion of the line from Madras to Saugor

I have the honour
&c
(Sd) W. Smith, Major R.E.
Officiating Superintending Engr

Rs 14-5-72 No 1339 of
" 4-12-72 " 2857 & 2852
" 26-3-73 " 947
" 17-6-73 " 1578 & 1579
" 19-6-73 " 1576 & 1577
" 1-8-73 " 1329
" 8-9-73 " 2224 & 2225
" 30-10-73 " 2652
" 20-12-73 " 3078 & 3079
" 19-2-74 " 413
" 16-3-74 " 714 & 715
" 1-5-74 " 1155
" 18-5-74 " 1328 & 1328B
" 15-7-74 " 1876.
" 3-8-74 " 2125 & 2126
" 7-12-74 " 3432 & 3433
" 17-2-75 " 457.

P.W.D.
18SEP76
No.

No 555

Cir - 28-9-76 Rtd 30-9-76
Dupts to Ors 19-9-76.

Railway Department.

From

The Consulting Engineer
for Railways,

To

The Secretary to Government,
P. W. Department,
Fort Saint George.

Dated 15th Sept.
Received 16th Sept. 1876.
No. 4568

Forwarding with
Estimate revised Co-
pies & Minutes for sanctioning
the Expenditure for Chingleput
Tindivanam Branch of
South Indian Railway
Extension and
Estimate to
Govt

Public Works Dept.

No 2635

Proceedings of the Madras Government

Under date the 30 Sept/76.

Read the following—

From

The Consg. Engr. for Railways } (H.E. No 456 A dy 15th Sept/76)

Ordered that these papers be forwarded to the Govt. of India and that the sanction of that Govt. be requested to the net excess of Rs 2832,478 over the original sanctions aggregating Rs 120,25,420 for the two sections of the South Indian Railway extending from Madras to Tanjore.

(H.E. No 2636 dy 30 Sept/76)

Consg Engr for Rys. √
Rs pd - 6-11-76

No 2636 dated 30 Sept/76.

To,
The Secy: to the Govt. of India

Sir,

I am directed by His Grace the Governor in Council to forward herewith revised Estimates for the two sections of the South Indian Railway between Madras and Tanjore.

2. In your letter No. 306 G.R. dated 25th Feby. 1873 the sanction of the Govt. of India was communicated to an outlay of Rs 69,10,522 for the Section of the line between Madras and Cuddalore. This was subsequently increased by Rs. 83382 on account of Estabt.* thus raising the total sanction to Rs 69,93,904. The Estimates now submitted

*Letter No. 1200 G.R. dd 12th July/73

for this section amount to Rs 93,39,394 or Rs 23,45,490 in excess of the existing sanctions. The original estimate for the Cuddalore Tanjore Section amounted to Rs 5031516, while that now submitted is Rs 5594824, exhibiting an excess of Rs 563308. The aggregate of the existing sanctions is therefore 120,25,420 as against revised Estimates amounting to Rs 114,34,218. From the latter sum however Rs 76,320 have to be deducted on account of Telegraphs, leaving Rs 1185,7898, or a net excess of Rs 28,32,678 as the amount now requiring sanction.

3. The causes of the excess are dealt with in detail in the Note by the

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Estimated cost of the several station buildings compared.
Madras to Cuddalore Section

Description of building	Name of station selected for type	Estimate	Total cost	Cubic yards of masonry	Square feet roofed	Cost per square foot roofed	Remarks.
Ticket Office 2. class	St. Thomas' Mount	Original	17,000	"	4,900	3·40	
		Revised	11,130	560	4,645	2·—	
Ticket Office 3. class	Guduvancheri	Original	850	38	672	1·26	
		Revised	2,676	110	1,411	1·89	
Latrine	do	Original	280	"	192*	1·46	* Sq: feet enclosed space - roofed
		Revised	685	62	215*	3·17	* " " " " unroofed
Waiting shed	Palaveram	Original	870	51	575	1·51	
		Revised	1,300	99	503	2·58	
Goods shed	Cuddalore	Original	9,550	422	3,070	2·46	
		Revised	10,050	716	3,000	3·35	
do	Lindavanam	Original	3,680	209	1500	2·45	
		Revised	4,925	270	1,500	3·28	
Godown	Chelambaram	Original	1,600	"	600	2·66	
		Revised	3,006	178	6444	3·56	
Engine shed	Cuddalore	Original	6,370	331	2,244	3·06	
		Revised	36,143	1,327	8,100	4·46	
Station masters bungalow		Original	1,280	93	1,007	1·10	
		Revised	1,000	"	783	1·27	
Platforms	Palaveram	Original	455	37	300*	3·33*	* Lineal feet
		Revised	1,918	112	300*	10·08*	* Cubic feet per foot run.

Note: Black figures refer to original estimate.
Red " " " Revised "

O. Smith Majr R.E
Offg Cons: Engr for Railways

Madras
15 Sept 1863

Compara

I Preliminary Expenses.

II Land.

III Construction of line

1 Earthwork.

2 Bridgework.

(a) Ulnior bridges & culve

(b) Large bridges

4 Level crossings.

5 Fencing

6 Temporary Telegraph

IV Ballast and Permanent way

1 Ballasting.

2 Permanent way.

P.W.D.
19 FEB 76

6758

Govt. of [1876] Madras.

PUBLIC WORKS.

To The Chief Engr for Irrt

Dated
Recd
Encl.

Encl. 2035

G. O. 30 Sept. 1876. No. 2636

Nos. 2035

Southern Indian Railway

Extending from Madras

to Tanjore

Ordered that

the Papers [illegible]

[illegible] dated Estimates

for the two reaches of the

——, be forwarded for the

sanction of the Govt of India

——

Recommending for the

sanction of the Govt of India

dated Estimate for the

two reaches of the S.I.Ry

Extending from Madras

to Tanjore -