

(1) Number of pages 105
(2) Date of repair 23-4-38
(3) Initials of the Referencer F

MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

Ac - 345/659

G.O. No. <i>1022</i>	<u>Press</u> <u>Mis.</u>
<i>(166)</i> Dated <i>2-5-</i> 18 <i>59</i> .	

Not to be folded or roughly handled

1376/80
16874/80

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Not to be folded or roughly handled

1 R.
Superintending Engineer
Central Circle of P. Works
Fort Saint George, 15th Madras

From, The Off^r Superintending Engineer
Central Circle.

To, The Chief Engineer
Department P. Works

Sir, Madras 15th Nov. 1857

On the 11th August 1856, Government directed the assembly of a Committee, for the purpose of considering and reporting on the views set forth by Lieutenant Sankar, on the state of Cochrane's Canal and the proposed new Cut. On the 17th November 1857, the Committee submitted a Report, treating of a part of the subject only, which was forwarded to Government, with Extract Proceedings N^o 5406 dated 21st Idem.

2. In January 1858, Government in Ex. Mens. Cons. N^o 166 dated 4th, in passing orders thereon, directed the preparation of Estimates for carrying out the Committee's proposition, regarding
Landings

Landing places near Sadras, and in the Saint
Thomé Backwater, and on the 15th March 1858
N^o 282, the Superintending Engineer in charge of
the Central Office submitted his own views on the
matter, as there then did not appear to be any proba-
bility of the Committee, of which he was a mem-
ber, being able to meet again for further discussion
of the question. This communication was in de-
tailed Minutes of Consultation N^o 900, dated 11th Mar 1858
returned for report, and referred to Captains
Chambers and Moberly, for their careful and de-
liberate opinions on the views enunciated by Lieut^t
Sanku.

3. Lieutenant Sanku states, that the
present line of Inland Navigation, consisting
partly of ^{natural backwaters, and partly of} artificial Canals, cannot be so improved
as to connect the whole line, into one of 1st Class navi-
gation; but that it is both feasible and expedient
to construct a separate and distinct Canal, parallel
to the Coast, protected from inundation by high
and strong Banks, and available at all seasons.

4. On the means of supply to the
new line of Canal proposed by Lieutenant Sanku,
the

the Government particularly requested the opinion
of the Committee. This was not entered into,
reported however, that Lieutenant Sanku, in
advocating the total rejection of the present line
in favor of a new one, had not sufficiently consid-
ered the actual value of the present work, which in his
opinion should be extended, rather than reform
and that the formation of a new line was not ex-
pedient.

5. Colonel Lawford considers, that
such local purposes, as the communication be-
tween Madras and the Salt Works, and the Villages
surrounding the Pulicat Lake, the line is as effe-
cient as it need be, and that so long as the requisite depth
can be maintained, no other improvement is called
for.

6. With respect to the extension of the
line northward, and its applicability to purposes
more general Traffic, Colonel Lawford is of opinion
that Lieutenant Sanku's plan is totally imprac-
ticable, to say nothing of its being wholly dispropor-
tionate to the advantages anticipated. Moreover
consu

considers, that all permanent improvements of Backwater navigation to be equally impracticable, and does not believe in the possibility of forming at a moderate cost, or with the prospect of permanent advantage, an extended line of Tidal Canal along either coast; but is of opinion, that short Canals connecting different points for the purpose of local traffic, might be constructed with comparative economy and good results. Colonel Lawford also considers, that to carry out the original idea of one continued line of navigation near the Coast, no plan but that of forming a perfect Canal, to be fed by large Rivers of fresh water, or to run on such a level as to be safe from inundation, will succeed: but doubts, whether such an undertaking would be profitable, as he imagines it would be more advantageous for ships to touch at Ports more than 100 miles from Madras to receive their Cargoes, than for goods to be conveyed by Canal to Madras.

Colonel Lawford in a subsequent Memorandum, under date the 28th February 1859, ^{states} that he considers the excavation of a Canal between the present line and the sea, to be utterly unfeasible; the soil consisting generally of almost pure sand

sand, being of itself an insuperable obstacle to 1st part of Lieutenant Sankey's project.

8. Both Captain Chambers and Lieutenant Sankey advocate a Tidal Canal, protected with high banks against inundation and as much as possible isolated: the points on which they differ from each other are stated by the former Officer:

"He objects to Locks, advocating Flood Gates instead; is against crossing Lagoons, where they deep-wishes for a Canal of a greater depth; that the one proposed by me, and finally ends by recommending the construction of an entirely new line of communication 24 miles in length between Madras and Pulicat to the East of the present one."

9. Captain Chambers does not consider that Locks are indispensable, but thinks that erection of one at Shudiancochum, would be of great utility; and maintains, that as on the Coast, rivers must be crossed somewhere, that it is better to cross them where they are already deepened out by natural causes, than where they are shallow.

With

10. With respect to the present Line from Madras to Pulicat, he proposes abandoning 12 miles out of the 24, but does not approve of the Line selected by Lieutenant Sanchez, as he believes it to be impracticable to take a Line from Madras to Pulicat, which shall be comparatively straight, hardly touch a Backwater, and not be interfered with by any drainage.

11. Captain Chambers dissent from Colonel Lawford's opinion, of the impossibility of establishing a 1st Class Tidal Canal. Tidal Canals exist in the Country, and is, he thinks a *prima facie* reason, why their construction here should be no impossibility; time and money being the important ingredients in the success of the undertaking.

12. He agrees with Colonel Lawford in the opinion, that a fresh water Canal, quite isolated, and supplied from Reservoirs, would be preferable to a tidal one, were it not that the expense, the Engineering difficulties and the time it would take to execute, are all against it; but doubts whether such a line would be profitable.

Captain.

78
13. Captain Moberly remarks, with reference to the 1st portion of the Canal viz. "Cochranes Canal," that it is cut in the lowest ground, and that any new one must be cut at least 5 feet, and in many parts 8 or 9 feet deep, while the present line requires deepening 2 or 3 feet at most, to obtain the proposed depth. "so that if it be even proved, that the Shediancoosum Lock is useless, it will be better to improve the old, than to cut an entirely new line through sandy ridges and at a considerable cost."

14. From Shediancoosum to Pulicat is a series of Backwaters or cuts, the line running generally through low ground, divided only from the sea by a Beach: though this Captain Moberly states "no man will doubt, it will be more difficult to excavate, and more liable to shoal itself." He points also to the new cuts made near Carinool and Calinye, as supporting his views.

15. In questioning the economy of Lieut. Sanchez's proposed Line generally, he observes that his opinion, "adhering to the present Line, and extending it to Pullare at least, before expending any money in the immediate portions, has been strengthened by the experience acquired of the work executed on Lieut. Sanchez's principle."

16. There is no doubt, that an isolated Canal supplied

from Reservoirs would be preferable to a Tidal Canal; but the immense expenditure such an undertaking would entail viz in the construction of aqueducts, embanking on account of the disparity of levels and tunnelling &c, renders it almost unnecessary to consider the question; the advantages in prospect being so wholly inadequate, unless irrigation be combined with navigation purposes.

17. It must be borne in mind by those who advocate this system, and point to the High Level Canal between the Godavary and Krishna, as an example in favor of their views, that there is no similarity in the cases, the one line running through an almost level alluvial soil, requiring but little or no embanking, and very little cutting, while the other must be conveyed across the numerous valleys by masonry works, the number and extent of which may be imagined from the great amount of water-way allowed on the great Northern Road between Madras and Billore.

18. In the event of the formation of a new Canal being seriously contemplated, when the present restrictive orders are removed, I would recommend, that a Line of Tidal Canal should be formed, at a greater distance from the Coast than the present Canal, which would not be liable to the disadvantage of annually filling up with the deposits of drift sand, as in those parts lying near the Coast, and

98
other parts where the line has been cut through Sand Hills, while it retained all the advantages of the existing line as a Tidal Canal.
19. The Eastern embankment particularly in the case of the Southern portion of the E. C. Canal, between Munnampet & Tranquebar, would not then be subject to the either annually breached, or to a great extent destroyed by the spray & washing of the waves during the N. E. Monsoon as at present.

20. As regards the question of Locks in Canals there are not always indispensably necessary, but are useful in some instances to keep up to the required level, water accumulated during the Monsoon Months, for the convenience of the navigation for a longer period during the dry season; or others to keep up the tidal water, when boats could be locked up into the Canal at low tide; & keep out the high floods of the Rivers during the Monsoon; but flood gates to keep out the high freshes of the River as recommended by Capt.

Capt. Sankar, could not without great difficulty
be closed or opened against even a small difference
of level, & would involve the stoppage of Traffic,
during the periods of freshets they would then
as the Traffic, & particularly that of Passengers,
increased, be a great obstruction, & would
necessarily eventually be removed, & Locks sub-
stituted, if the floods are to be excluded from
the Canal.

21. In conclusion I quite agree
with the Committee in their opinion, that it would
be better to improve & extend the existing line,
& keep it in as efficient a state as possible
by dredging, & deepening & embanking portions
of the Backwaters where necessary, abandoning all
present thoughts of a new work, until such time as
the Indian finances will permit the Govt. to remove
their restrictive orders on expenditure on P.W., when
if the existing line in its improved & extended
state is found inadequate to the requirements of
traffic, the formation of a new Padal Canal,
at a greater distance from the Coast, would
be

be the most advantageous.

M^r W. L. Burdwood
Goff Lake Bay C.C.

True Copy
W. L. Burdwood
Chief Engineer

Memorandum

Sankey's Survey of the Northern Coast Canal
Chief Engineer

In their order of the 11th August 1857 No 1560, the Government appointed a Committee of which I was a Member to consider and report on a proposal of Captain Sankey's to alter the line of the Northern Coast Canal which was accordingly partly done, and the report submitted on the 17th November 1857. Owing to various causes this Committee did not afterwards assemble and finding its indefinite postponement probable, I drew up a paper on the 15th March 1858, containing my own views on the subject. This was referred to Captain Moberly then Superintendent of the Canal and to Captain Chambers District Engineer of the Eistnah Division, who sent in their own reports on the question referred to them.

2. Captain Moberly seems to think I altogether mistook Captain Sankey's views in supposing that he supported the proposal for a perfectly formed Canal independent of the Sea and fed by great freshwater reservoirs

Copied in a letter to Captain
of 11th Aug 1858 - 15.26

Enclosure in a letter from
the Chief Engineer.

to the Secretary
to Government P.W.S.

Dated 25th March 1859.

17th 1858.
000905189

Copy of a letter from
the Superintendent of the
Central Circle, offering certain
observations on the subject of
extending and improving
the Eastern Coast Canal.

reservoirs," and as regards the first part of the line I must admit that, I did it as Captain Sankey clearly advocates the cutting of a new line to the East of the present one. But he as plainly says that "Between the Tornamooky and Rampairot Rivers" a careful examination of the ground will be required, and I think a high level channel will have to be adopted. Para 60.

I consider the excavation of a canal between the present line and the sea to be utterly unfeasible if as I believe the soil generally consists of almost pure sand and this alone would in my opinion form an insuperable obstacle to the first part of Captain Sankey's project, and as already stated. I believe the cost of constructing and maintaining a high level channel of navigation, would be greater than any advantages it promises would warrant.

No one I think would have formed the plan of cutting a canal several hundred miles long parallel to the coast, except under such apparent advantages as those afforded by connecting the

the natural backwaters and creeks of which the original projectors of Cochrane Canal availed himself, and my present objections to that line are founded entirely on the difficulties attending its establishment as a whole proving far greater than was anticipated

trial Office of Public Works
28th February 1859.

(Signed) G. Lawford.
Capt. Eng. Southern Circ.

(True Copy)

W. L. L. Colonel
Chief Engineer.

Report of the Water-Measurement of the Canal from 1 April 1861

Month & date	Time	Depth below North Gate		Depth above South Gate		Difference	
		Feet	Inches	Feet	Inches	Feet	Inches
April 1858	1 st 7 A.M.	3	6	5	6	2	0
	" 12 P.M.	"	"	5	6	0	6
	" 8 A.M.	3	6	5	6	2	0
	" 1 A.M.	"	"	5	6	1	0
	2 nd 8 A.M.	3	6	5	6	2	0
	" 2 P.M.	"	"	5	6	0	6
	" 8 P.M.	3	6	5	4	1	10
	" 1 A.M.	"	"	5	5	0	2
	3 rd 9 A.M.	3	6	5	6	2	0
	" 2 P.M.	"	"	5	5	0	4
	" 9 P.M.	3	6	5	6	2	0
	" 2 A.M.	"	"	5	5	0	3
	4 th 9 A.M.	3	6	5	6	2	0
	" 2 P.M.	"	"	5	5	0	4
	" 10 P.M.	3	6	5	4	1	10
	" 2 A.M.	"	"	5	5	0	2
	5 th 10 A.M.	3	6	5	6	2	0
	" 3 P.M.	"	"	5	5	0	3
	" 11 P.M.	3	6	5	7	2	10
	" 3 A.M.	"	"	5	5	0	3
	6 th 12 P.M.	3	6	5	6	2	0
	" 4 P.M.	"	"	5	6	0	11
	" 1 A.M.	3	5	5	5	2	0
	" 3 A.M.	"	"	5	5	0	10
	7 th 10 A.M.	3	6	5	6	2	0
	" 4 P.M.	"	"	5	5	0	6
	" 11 P.M.	3	6	5	5	1	11
	" 4 A.M.	"	"	5	5	0	6
	8 th 2 P.M.	3	6	5	6	2	0
	" 6 P.M.	"	"	5	6	0	10
" 11 P.M.	3	6	5	5	2	0	
" 4 A.M.	"	"	5	5	0	0	

Only in a letter to General
of the day to the 26.

Enclosed in a letter
from

The Chief Engineer

The Secretary & Co.

Wm. D. Howells

211-21-
 25-3 March 1893
 Dec 2

69/00600

Copy of a Memorial
from James Daniel Esq. Captain
of Engineers stationed there
on the subject of Capt. Wm.
Sandwich's Report to a Ho. of Reps.
of the 10th March last
Dated. -

Month and date	Time	Depth below north Lake				Depth above south Lake				Difference at high & low water	Month and date	Time	Depth below north Lake				Depth above south Lake				Difference at high & low water	1918
		Feet	Inches	Feet	Inches	Feet	Inches	Feet	Inches				Feet	Inches	Feet	Inches	Feet	Inches	Feet	Inches		
April 9 th 1858	2 P.M.	3	6	.	.	5	.	.	.	7. 1	April 19 th 1858	7 A.M.	4	4	.	.	5	9	.	.	1	5
" 10 th	10 P.M.	.	.	5	6	.	.	6	.	0. 6 H	" 1 P.M.	1 P.M.	.	.	5	7	.	6	.	.	0	5
" 10 th	4 A.M.	4	1	.	.	5	6	.	.	1. 5 L	" 7 P.M.	7 P.M.	4	4	.	.	5	6	.	.	1	2
" 10 th	9 A.M.	.	.	5	.	.	5	6	.	0. 6 H	" 2 A.M.	2 A.M.	.	.	5	6	.	5	8	.	0	2
" 10 th	3 P.M.	3	10	.	.	5	8	.	.	1. 10 L	" 20 th 1 P.M.	1 P.M.	4	2	.	.	5	10	.	.	1	8
" 10 th	9 P.M.	.	.	5	6	.	.	6	.	0. 6 H	" 3 P.M.	3 P.M.	.	.	5	6	.	6	1	.	0	7
" 10 th	4 A.M.	3	8	.	.	5	5	.	.	1. 9 L	" 1 A.M.	1 A.M.	4	2	.	.	5	10	.	.	1	8
" 11 th	10 A.M.	.	.	5	4	.	.	6	.	0. 8 H	" 3 A.M.	3 A.M.	.	.	5	2	.	.	6	1	0	11
" 11 th	3 P.M.	3	10	.	.	5	6	.	.	1. 8 L	" 21 st 9 A.M.	9 A.M.	4	4	.	.	5	9	.	.	1	5
" 11 th	10 P.M.	.	.	5	6	.	.	6	2	0. 8 H	" 3 P.M.	3 P.M.	.	.	5	6	.	6	.	.	0	6
" 11 th	4 A.M.	3	8	.	.	5	6	.	.	1. 12 L	" 8 P.M.	8 P.M.	4	5	.	.	5	6	.	.	1	1
" 12 th	1 A.M.	.	.	5	6	.	.	6	.	0. 6 H	" 3 A.M.	3 A.M.	.	.	5	4	.	6	.	.	0	8
" 12 th	3 P.M.	4	8	.	.	5	11	.	.	1. 6 L	" 22 nd 10 A.M.	10 A.M.	4	4	.	.	5	6	.	.	1	2
" 12 th	4 P.M.	.	.	5	7	.	.	6	7	0. 6 H	" 6 P.M.	6 P.M.	.	.	5	7	.	6	.	.	0	5
" 13 th	12 P.M.	4	4	.	.	5	6	.	.	1. 2 L	" 1 A.M.	1 A.M.	4	4	.	.	5	7	.	.	1	3
" 13 th	3 P.M.	4	.	5	.	6	.	6	3	0. 3 H	" 4 A.M.	4 A.M.	.	.	5	6	.	5	10	.	0	4
" 13 th	2 A.M.	.	.	5	.	6	.	6	1	1. 7 L	" 23 rd 2 P.M.	2 P.M.	4	6	.	.	5	8	.	.	1	2
" 14 th	6 A.M.	4	2	.	7	.	6	.	.	0. 6 H	" 8 P.M.	8 P.M.	.	.	5	9	.	6	1	.	0	4
" 14 th	12 P.M.	.	.	5	7	.	6	.	3	1. 10 L	" 4 A.M.	4 A.M.	4	7	.	.	5	6	.	.	0	11
" 14 th	4 P.M.	4	4	.	7	.	6	.	3	0. 8 H	" 24 th 9 A.M.	9 A.M.	.	.	5	9	.	6	.	.	0	3
" 14 th	3 A.M.	.	.	5	7	.	6	.	1	1. 8 L	" 4 P.M.	4 P.M.	4	4	.	.	5	8	.	.	1	4
" 15 th	7 A.M.	4	3	.	7	.	6	.	1	0. 6 H	" 10 P.M.	10 P.M.	.	.	6	.	.	6	4	.	0	4
" 15 th	1 P.M.	.	.	5	5	.	6	.	1	1. 9 L	" 5 A.M.	5 A.M.	4	4	.	.	5	6	.	.	1	2
" 15 th	5 P.M.	4	2	.	5	.	6	.	.	0. 8 H	" 25 th 9 A.M.	9 A.M.	.	.	5	9	.	6	3	.	0	6
" 15 th	4 A.M.	.	.	5	2	.	6	.	7	1. 10 L	" 4 P.M.	4 P.M.	4	6	.	.	6	.	6	3	1	6
" 16 th	8 A.M.	4	5	.	.	5	9	.	.	0. 11 H	" 11 P.M.	11 P.M.	.	.	5	10	.	6	3	.	0	5
" 16 th	1 P.M.	.	.	5	6	.	6	.	.	1. 4 L	" 4 A.M.	4 A.M.	4	6	.	.	6	1	.	.	1	7
" 16 th	6 P.M.	4	3	.	.	5	6	.	.	0. 6 H	" 26 th 10 A.M.	10 A.M.	.	.	6	.	.	6	4	.	0	4
" 16 th	3 A.M.	.	.	5	6	.	6	.	1	1. 6 L	" 5 P.M.	5 P.M.	4	7	.	.	6	2	.	.	1	7
" 17 th	6 A.M.	4	3	.	.	6	.	6	.	0. 7 H	" 10 P.M.	10 P.M.	.	.	5	10	.	6	4	.	0	6
" 17 th	1 P.M.	.	.	5	6	.	6	.	.	1. 9 L	" 5 A.M.	5 A.M.	4	7	.	.	6	.	.	.	1	5
" 17 th	6 P.M.	4	.	5	6	.	6	.	1	0. 7 H	" 27 th 11 A.M.	11 A.M.	.	6	.	2	.	6	4	.	0	2
" 17 th	3 A.M.	.	.	5	5	.	6	.	.	1. 2 L	" 4 P.M.	4 P.M.	4	6	.	.	6	1	.	.	1	7
" 18 th	4 A.M.	4	5	.	5	.	5	.	2	0. 9 H	" 11 P.M.	11 P.M.	.	.	6	.	.	6	4	.	0	4
" 18 th	2 P.M.	.	.	5	7	.	6	.	2	1. 4 L	" 5 A.M.	5 A.M.	4	7	.	.	6	2	.	.	1	7
" 18 th	7 P.M.	4	4	.	6	.	.	6	.	0. 7 H	" 12 P.M.	12 P.M.	.	.	6	4	.	6	5	.	0	1
" 18 th	3 A.M.	.	.	5	6	.	6	.	2	1. 8 L	" 4 P.M.	4 P.M.	4	7	.	.	6	2	.	.	1	7
" 18 th		.	.	5	.	.	6	.	.	0. 8 H	" 4 P.M.	4 P.M.	4	7	.	.	.	.	.	.	1	7

No 8968. Central Office
 Port Saint George
 25 March 1858
 From
 The Chief Engineer
 To The Secretary to Govt.
 Public Navigation - Sir

Adverting to the orders
 of Government referred to in the
 margin, I now do
 myself the honor to
 forward the following
 further papers on the subject of Sir
 Tennant & Co's proposed new line
 of Canal dated 15th April 1857,
 which have been placed on record
 in the Central Office since the
 Government was last addressed
 the subject - viz.
 1st A Memorandum by Colonel
 A Collier Commandant of Eng.
 which that Officer kindly drew
 up at my request and now permit

From Govt 26 Feb 1857 No 371
 do do do May 1857 No 520
 From do 11 August 1857 No 1560
 do do 21st November 1857 No 5406
 From do 29th Decr 1858 No 1661
 do do 11 May 1858 No 900

Encl^o 7.
 2 Copies of Memo.
 4 do of letters
 1 do of report.

Copy in letter to Engin.
 27 May 1858 No 21.
 Enclose in a letter
 From
 The Chief Engineer
 To The Secretary to Govt.
 25 March 1858
 11.5.58
 Copy of a report of
 the Works Department
 of the Canal from 1st June
 1858.

permits to offer for the consideration of Government in which he reviews Captain Sankey's propositions, and dissents from his views.

2^d A letter N^o 282 dated 15 March 1858, from Lieutenant Colonel Sawford in his capacity of Member of a body, he despairs of reassembling, or Collective Committee under the orders of Government N^o 166 dated 29th January 1858

3^d A letter N^o - dated 21st May 1858, from Captain Chambers late Superintendent East Coast Canal, examining Captain Sankey's suggestions.

4th A letter N^o 451 dated 26th May 1858, from Captain F. Moberly, the then Superintendent East Coast Canal, also in examination of Captain Sankey's suggestions

5th A Memo N^o - dated 28th Feb/1859 from

from Lieutenant Colonel Sawford on leaving the Central Office duty.

6th A précis of all the foregoing (except Colonel Cotton's Memo) by Major Birchwood as Superintending Engineer Central Circle, dated 15th March 1859.

2. I cannot doubt but that these several papers (especially that in which Lieutenant Colonel Sawford acknowledges the change in his opinions of Coast water communication have undergone during the recent discussions) will be perused with much interest and that possibly the Government may resolve to publish the whole series of records to which Captain Sankey's paper has given rise - as one small pamphlet.

3. I have nothing to add on my own part to the opinions I did myself the hono

to express on the 20th May 1857, N^o 220,
in first forwarding Sientenont's
Sankey's Report, and on the 21st
November 1857, N^o 3106, when trans-
mitting the first Proceedings of the
Special Committee

I have the honor to be,
Sir
Your most Obedient Servant
Edw. L. Colver
Colonel
Chief Engineer

Fort Saint George

25th March 1859

Effective River Navigation.

3. In Lieutenant Sankey's report up to the 12th Par., the defects of the Canal are dwelt upon, but in the 13th he mentions what the effects of it are in a single line, viz. that goods are carried along it at less than 3 pice a ton a mile, and he adds that the Boats are so bad that if suitable ones were substituted, the Canal could be worked at 2 pice a ton, (for short trips). and last year 120,000 Tons were moved along it, which at an average distance of 50 miles would be a saving (at 2 annas a mile) compared with land carriage of $4\frac{1}{2}$ Lacs of Rupees.

4. Now can there be a question about which we ought to do, to give up our time, money and labour to improve this Canal and so reduce the cost of transit from 2 pice to 1 pice, or spend the same time, money and labour on the extension of the Canal, and so reduce the cost of traffic on the new line from the land rate 24 or 30 pice, to 2 pice.

5. If we involve ourselves in the labyrinth of excellencies or defects of works we are lost; if we confine our attention to effects, it is the simplest thing in the world to form

a sound judgment. Nothing could be easier than to write a long report on the excellencies of the Railway, on its magnificent terminus, on the sums that have been spent on Iron, on Aqueducts &c. on the power, beauty and splendid workmanship of the Engines, on the handsome appearance of a train, on the great speed &c.; and on the other hand as Lieutenant Sankey has done, on the miserable defects of the Canal; but the simple facts, that the latter can carry at 2 pice a ton to a mile or is of the cost of carriage by a common road, and that the latter charges so much more than the common road that the great mass of the traffic goes by Bullock Carts as before, while the Railway does not pay 3 per cent, is unmistakably conclusive as to which of the works is effective.

6. It is the destructive principle above mentioned that is the grand obstruction to the material improvement of India, and every effort must be made to expose it and get rid of it.

The contrary principle if recognized, at once sets aside all such projects as this of Lieut. Sankey's.

7. I will next offer some remarks on the paper in detail.

We have nothing to do with the standards of Canals if recognized in all civilized countries, first because

assuredly

assuredly there is no such standard; in England they are in general not fit for steam boats, in France, they use steam at slow speeds, in Canada, they have a complete steam boat Canal, &c., and whatever they do in other Countries, we have to consider what is best in our circumstances, which are perfectly distinct from those of the highly civilized Countries. Here we have a vast extent of country, combined with a vast population and the whole Country without cheap transit, and at the same time liable to famine. These circumstances are perfectly distinct from those of either Europe or America. —

2. — I therefore insist upon it as most clearly the fundamental point, that it is not our great object to establish a 1st Class coastal communication, but that our object is to establish really cheap communication, (at 1 or 2 pice a ton) over the greatest possible extent of line. —

3. — In the 6th Par. Vic^{mt} Stanley says that in his opinion the Lock has failed in the main point which was to make this portion of the Canal a fit termination of at least 600 miles of navigation. As the proposer of the Lock I may assert that this is a mistake, I had no such main point in view. It would have been quite contrary to my fundamental principle, which I endeavour never to lose sight of. — elly objects were. —

To

1st To keep the water in the Canal at a higher level in the dry season, so as to cover its bed. —

2nd At a moderate expense and without stopping the trade to secure a better depth of water in the Suez Canal, and so keep the Canal open during the dry season, and lower the cost of transit. —

10. Most assuredly these points have been completely gained. The Superintendent at the basin has informed me that there has not been the slightest hindrance to the traffic all this the past hot season, that the depth of water has been about 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$ feet greater than before the Lock, and that there has been an increase of traffic in the last year of 35 per cent. Now when we increase the depth of a navigation from 1 or 1 $\frac{1}{2}$ feet to 2 $\frac{1}{2}$ or 3 feet, we make all the difference, the difference between a Canal that cannot be worked with advantage to one that is perfectly effective, for with Locks 150 feet long and 15 feet broad thoroughly good boats can be used carrying 100 Tons on a draught of 2 $\frac{1}{2}$ feet. The present lock is 20 feet broad, which I consider quite out of proportion. —

11. — The account of the Canal given in a certain sense in detail in this report is very imperfect, so that I cannot make out from it, what draught of water a

boat

boat must have to pass along it, in the different seasons of the year. In one place indeed he says, the depth is not more than $1\frac{1}{2}$ feet at mean tide, but he does not state, what months of the year the water ordinarily stands at, above or below that level, and all through the remainder the depth is not mentioned at all. At one place he says "to class this portion of the Canal as a navigation were impossible". - There is no clue whatever to what depth of water these words imply or what portion of the year they refer to. I have heard of both goods and passengers boats using this portion of the Canal lately, at the end of the hot season, so that it certainly is navigable. - What was wanted was a simple statement of the least depths of water in the different portions of the Canal at the different periods, and the lengths over which this shallow water extends. - After reading this long account, we are left entirely ignorant of the only two essential points, viz. First, what is the depth of water in the shallow parts, in the different portions of the year, and 2nd What length of the Canal is so shallow? -

12. In the 12th Para Lieutenant Sankley gives the depths of some of the Canals in Europe and America. I cannot see how this affects the question. If we have got a Canal so effective that it can be worked for short

trips

trips at 2 or 3 pice a mile, thus relieving trade from $\frac{9}{10}$ of the cost of carriage, it cannot the least alter the case that the Caledonian Canal is 20 feet deep.

13. The question is, is the Canal so deep and the cost of transit consequently so high as that it can be materially reduced by improvements, and therefore that it is more important to expend money upon this, than to extend the line. This I must submit is the real question. - Are we to employ ourselves in improving the means of transit on that part of the Coast line where the cost is 2 or 3 pice rather than those parts where it is 24 to 30 pice? -

14. - Lieutenant Sankley then proceeds to estimate the future traffic by the East Canal at 50,000. I have no doubt that it will far exceed this when the interior of the Country is opened up, indeed we have no data by which to judge what the traffic of so vast a Country with so great a population will be if cheap transit is provided. - The traffic on the Cocanassa Canal from Doolishwarum Anicut is already 150,000 Tons, although it only affects a Country containing $7,800,000$ people, and it is increasing with surprising rapidity. - But Lieutenant Sankley does not shew that the present Canal is incapable of conveying 50,000 Tons a year, and if he did, it would

not

not prove that we ought not to let it alone for the present, as it abundantly answers present purposes. - The traffic in the past year was 120,000 Tons.

15. Vicent Sankey then proposes that in the future portions of the Canal, additional depth should be obtained rather by cutting the Canal deeper, than by using Locks to keep it up to the level of high water, 1st. I quite agree with that Officer, that Locks as causing some delay and requiring an establishment which without constant watching will certainly interfere oppressively with the trade, should be avoided if possible, and if the work can be done as quickly and cheaply without them, I would not use them, but this must be a question for each portion of the Canal. I think however Vicent Sankey must have overestimated the cost of the Locks and underestimated that of the deepening. I can hardly think the last year could be cut at 1st per Cubic yard, tho' certainly, as he says, with proper baling arrangements, the water could be kept down in the excavations without much expense.

16. In the 18th para he says, "taking one day with another throughout the year, I do not think 6 inches of depth of water is added by the Lock." But the real question is what is added in the dry season, that is when additional

315
additional depth is wanted. The Superintendent told me it was about 1.5 in Cochrane's Canal. Vicent Sankey, Para 21, states it at 1 foot; but 1 foot, making the difference between 1 foot and 2 feet, or 1 1/2 feet and 2 1/2 feet, in fact makes all the difference; as is shown by what Vicent Sankey states, viz. that the toll was in part remitted from deficiency of water for 1 month in 1855, and 9 months in 1856; whereas I am informed that this year in consequence of the Lock there has been no deficiency at all.

17. As to Vicent Sankey's proposed section of Canal, I think ultimately it might be well to have it as wide as 20 yards at bottom to allow for a vast trade of 4 or 5 Million Tons of goods, with numerous passenger boats, but certainly there is no immediate necessity for it, and to cut 100 miles of such Canal, instead of 200 of half the dimensions I consider a great mistake in present circumstances. A Canal 10 yards broad at bottom, with Locks 1/2 way, 150 feet long would accommodate an enormous traffic 1 or 2 Million Tons and abundantly suffice for the present. But I entirely disapprove of Locks 20 feet broad, as encumbering broad boats which are equally injurious to the owners and to the traffic. Fifteen feet as in Rajahmundry I consider the outside width; they

they admit of Boats carrying 50 Tons, her foot of draught besides the light draught which would be 6 inches. —

17 The 32nd Para is curious. No District Engineer thinks it a matter of course that his tanks should burst in a storm. —

18 It would certainly be advisable ultimately to bank off the Canals so firmly, that even in such storms as occur only once in many years, no mischief would be done, but I hold that while we have so much to do of immeasurably more importance, we had better defer this part of these works. —

20 I agree as I have said that the cost of baling by steam power from the excavation will be inconsiderable. —

21- I do not know how Lieut. Sankey's Estimate of Rupees 6,300 a mile, of actual excavation, agrees with the actual cost of the Southern Canal.

22 Lieutenant Sankey still reasons upon having a single pair of gates at each end of each portion of the Canal, to keep out the high freshes of the rivers, but this involves the stoppage of the trade at those times. Eventually this must be avoided, as the Passenger traffic will be of too much importance

importance to be so obstructed, and then complete Rocks must be built, if the floors are to be kept out of the Canals. —

23 Lieutenant Sankey says (Para 41) that he only proposes the substitution of deeper cutting for Locks, between Kistnapatam and Sadoras. —

24 I should mention that north of Kistnapatam, I would certainly carry on the Canal on the level of the Kistnah Canal. Both Captain Orr, and Captain Russell, are cutting the high level Canal on a very large scale at about 7,000 Rupees a mile, and at that price I think there can be no question that it will be better to cut it all the way to Nellore on that level, rather than along the Coast, for these reasons. —

1st It will pass through the heart of the District accommodating populations on both sides. —

2nd It will combine irrigation with navigation.

3rd It will be quite free from the defects of the existing water canal, and will carry at from 1/2 to 1 Pie per mile for long trips. —

25 — In Para 48. The Estimate of traffic when the communication is completed to Nellore, is estimated

estimated at 110,000 in the perfect Canal, but it is now 120,000 in the present imperfect line, leading as it were to nothing. —

26 The Canal should of course be connected with the Bellary Ancient Channel and the water communication thus completed to Bellary and I think the saving to the community on goods alone might then be very well estimated at 2 Annas per Ton per mile, for 300,000 Tons on 108 miles, or 40 Lacs of Rupees, and a toll of $\frac{1}{2}$ Pie a ton a mile would amount to 80,000 Rupees a year, in goods only. I must however here as in every paper urge that no tolls should be levied on such great thorough fares for the reasons I have given in papers connected with the Poorey. —

27 With respect to the proposal to close the Doogoorazepatam Canal and deepen it next year, I cannot judge, as there is nothing in this report to show what depth of water there is in it at present, at different seasons of the year. —

28 It will be seen thus, that I entirely disapprove of the Plan of making the present Canal deeper and wider, instead of extending the line. It is very dis appointing to see so much time lost

in

in this most important work. Every mile of the line from Panton to Pulicat, might have been begun at once and thus we might easily now have the Ristnah and Poorey connected with Madras, and water communication open from the Seat of Government to near Chundah, and to within 60 miles of Vizagapatam. —

29 I beg to lay down these two principles to be always kept in view by all Officers of the Public Works Department. Viz: —

First: That in the present state of things we must judge of every work by its effects and not by its defects. —

Secondly: That before we lose much time in planning any work, we should make a rough estimate, whether the money can be expended to our greater advantage in that way than in any other. —

Madras.

Signed A. Cotton Colonel
Commr. of Engineers.

True Copy

A. Cotton Colonel

Chief Engineer

N^o 282.

Superintending Engineer's Office
Central Circle of P. W.
Fort St. George 15th March 1858.

From

Major E. Lawford
In charge of Central Circle

To

Colonel C. E. Faber.
Chief Engineer D. P. W.

Sir,

1. As there appears to be no probability of the Committee on the Northern Section of the Coast Canal being able to meet and discuss any further, the question referred to them in C. M. C. N^o 166 dated 29th January 1858, and as I have given the subject more consideration than I could do, prior to the submission of the first report, I shall now endeavour to state the views I hold on the matter.

2. Lieutenant Sankey has recorded his opinion, that the present line of inland navigation, consisting partly of natural backwaters, and partly of artificial canals, cannot be so improved as to convert the whole line into one of first class navigation, but that it is both feasible and expedient to

Copy in a letter to the Chief Engineer.
11th May 1858.

Enclosed in a letter from
the Chief Engineer.
to the Secretary
to Government 1858

Enclosed 25th March 1859.

1st 29th 6th

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Copy of a Memorandum
by Colonel A. V. Cotton on
the Report of Lieut. Sankey
on the Northern Canal.

to construct a separate and distinct canal parallel to the Coast, protected from inundation, by high strong banks, and available at all seasons.

3. The Government, in requiring the opinion of the Committee on this proposition, have particularly desired their report on the means of supplying the Canal, (meaning I presume, that proposed by Lieutenant Sankey) with water.

4. The Committee of which I am a Member, have reported, that in advocating the total rejection of the present line, in favor of a new one, Lieutenant Sankey has not sufficiently considered the actual value of the navigation, which they think should be extended rather than reformed, and that the formation of the new line recommended by Lieutenant Sankey is not expedient; but into the question of the Water Supply, the Committee have not entered.

5. At the time I signed the report, I had not seen the Culicat Lake, nor the Canal to the north of Shediencoopum Lock, but I have subsequently had an opportunity of partially examining the navigation, and I have given the entire question more attention than

457
than before, and if the remarks I may now offer, should appear inconsistent with the views propounded by the Committee, they must yet be regarded, as that expression of deliberate and unbiased opinion, which it seems my duty to record.

6. I believe Lieutenant Sankey to be quite correct, in supposing that the constructor of Cochrane's Canal had no idea of forming a line of first class navigation, but only contemplated improving the means of a communication between the Capital and the Villages surrounding the Lake, as well as with the Salt Works, in which object he succeeded; and I also think, that for such partial, though very useful local purposes, the present line of navigation is as efficient, as it can or need be made.

7. The annual removal of Shoals from the track in the Lake and Backwater would effect all the improvements necessary to facilitate the common boat traffic now existing, which does not require speed, and is as cheap as possible. Delay in the transport of firewood, salt or shells for lime, is of no consequence: and so long as the requisites

depu

depth of water can be maintained, no other improvement is called for. But with respect to the extension of the navigation to the northward, and its applicability to purposes of more general traffic, I entertain no doubt of the difficulty of the plan being out of proportion to any advantage derivable from it; as I do not believe it would ever be profitable to carry produce from a greater distance than 100 Miles, by such a tortuous imperfect line, involving serious delays and obstructions; and I have no hesitation in stating it as my belief, that all permanent improvement of backwater navigation is impracticable.

9. If then the establishment of extended inland navigation along the coast, be so very desirable and promising and undertaking as it has been generally considered, I concur with Lieutenant Sankey in recommending, that it shall be established on a perfectly formed Canal, not dependent on the Sea or backwaters for its supply of water, but fed by great freshwater reservoirs, the construction of which must form the primary operation; but no safe opinion as to the positive advantages of such a scheme can

177
can be given, without far more information than is now available.

9. I ground my rejection of the system of extended tidal canals, on the proofs afforded during the last four years, of the difficulty of opening and maintaining them, through the sandy tracts so prevalent along the coast, and over which violent land winds blow, during the dry season, and of the effect of floods during the monsoon, in levelling the banks and filling the bed through the shallow lagoons, which form connecting links between the sand ridges, and above all, on the insignificant range of the tides, which almost nullifies the action of Locks.

10. I think that in some situations, short canals connecting the estuaries of rivers, may be conveniently and efficiently constructed; but I observe, that where such positive natural obstacles, as sand ridges and swamps do occur, they are to a greater or less extent insuperable, and defy all Engineering remedy.

11. No human power can prevent the rapid evaporation of the Culicatt Lake

49
Lake, nor the silting up of the cutting through the Cavelong Backwater, and no means have yet been found of arresting the sand drifts, which prevail at Sadras. No feasible plan has yet been suggested for overcoming the formidable difficulties arising from the high sandy ridge to the North of Pondicherry, nor has it been demonstrated, that the Canal can easily be carried through that Territory: and if at any one of these points the project fails, the whole undertaking must prove abortive.

12. My own executive experience in the South, is decidedly adverse to the idea of the Coast Canal being an easy and inexpensive work, and I must fully and frankly admit the very inadequate calculations I originally made; but there is no doubt, that the general opinion among Engineers, was in accordance with my own. The difficulties I have now pointed out were certainly underrated, and the level character of the country was too generally relied on, as a guarantee for the feasibility of the work, which has not been realized in practice.

13. With such practicable data before

before me, I should do great injustice both to Government and myself, were I to adhere to opinions formed, when no conclusions could be drawn from experience; and I must therefore not shrink from an avowal of any change of sentiments founded on practice. My views at present are these; that while I do not believe in the possibility of forming at a moderate cost, or with the prospect of permanent advantage, an extended line of tidal Canal, along the Eastern and perhaps the Western Coast, I think, that short Canals connecting different points for purposes of local traffic, may be constructed with comparative economy and good results.

14. I am also of opinion, that to carry out the original idea of one great continuous line of navigation near the Coast, no plan will succeed, but that of forming a perfect Canal, to be fed by large reservoirs of fresh water, and to run on such a level, as to be safe from inundation, but I greatly doubt, whether such Canal would be a profitable undertaking; because it would be more advantageous for ships to touch at Ports, more than one hundred

Miles

* See Collective Memo:
on Public Works 1854
P. 20, 21.

Miles from Madras, to receive their cargoes, than
for goods to be conveyed by Canal to Madras.

15. It would cost less for a ship to
touch at Cuddalore, and take in cargo, than to
bring such Cargo by Canal to Madras at 2 pice
per Ton per Mile, or about 1 Rupee per Ton for the
whole distance; and although coasting is
certainly interrupted by the Monsoon, yet the
foreign trade suffers little disadvantage thereby.
The employment of steam Tugs would overcome
the difficulties arising from contrary winds and
currents; and it is certain, that without Canal
Steamers, the inland passage from Port to Port
would almost always exceed in duration, that
which is made by ships in the most unfavorable
seasons.

I have the honor to be Sir
(Signed) G. Lawford Major
In charge of Central Circle.

True Copy/

W. L. P. Colonel.

Chief Engineer.

The Chief Engineer
in the S. M. S.

2. *Madras J.*

V^o. 316 7/4 May/58.

Scientific Society's views
generally do not differ much from
mine; where we do not agree it is

Days since I wrote to you
of the village of 5.26

1859 Defito

From
the Chief Engineer
to the Deputy Port

8700

Valid 25" }
Reserved } Maxwell

No 8965.
0000705/59.

Copy of a letter from
the Congress in ch of
Circle offering obser-
vations with reference to
Lt Muir of Can. Nov 6 & 7
29 January 1858 relative to the
argument for the Treaty
concerning bonds in regard to
the debt of Col. Adams
General & the proposed new
lines.

in matters of detail.

3 The end I advocate is a tidal Canal, one provided with high banks to keep out inundations and as much as possible isolated; he objects to locks, advocating flood gates instead, is against crossing lagoons where they are deep, wishes for a Canal of greater depth than the one proposed by me, and finally ends by recommending the construction of an entirely new line of communication 2 1/2 miles in length between Madras and Pulicat to the east of the present one.

His objection to the lock, I think, quite disposed of in Capt. Pollier's report paras from 20 to 28 passing. In my opinion, as I have before stated they are not inaccessible parts of the coast line, and they are not always of immediate advantage, but I hold that there are positions, and that Cheddi-voorum is one, where their erection

* 30th August
1856 N^o 219

erection is of great utility.

5582

5 The selection of the locality where an Estuary on the Coast is to be crossed is quite a matter of detail, on the Coast line the great rivers must be crossed one or more somewhere; they can't be avoided; they can't be passed under the line of navigation by dykes or under tunnels, nor can it be passed over them by Aqueducts: this being the case, it is surely best to cross them, where they are already deepened out by natural causes, than where they are shallow.

6 Sirth Lowrey wishes to deepen the Canal to 5 feet below mean tide. Of course if locks be deepened with, or deepening of the Canal is necessary, it does not however follow that he would always have 5 feet of water in his proposed work, for wherever it crossed an Estuary with an open bar, it would twice in 24 hours have considerably less than that depth of water.

thf

7 My schemes for the
extension of the present stretch of
Canal under discussion to the
North and South of the Presidency
proposed that these lines should
have their beds $2\frac{1}{2}$ feet below mean
tide, and that they should in initial
not be provided with locks; as the
Chief Engineer observed when re-
arriving the Southern project, the
"construction of the locks must
succeed it (the Canals) full ex-
cavation and development."

8 That the depth of
water in the straggling line from
Madras to Coorgooruz is so much
less than the $4\frac{1}{2}$ feet propo-
sed by me for the depth of a ma-
jorable Canal eventually to be pro-
vided with locks, or than 5 feet,
the depth Smith's Linky recommends
for a line without these appliances
is due to its being an incomplete
work.

It

9 It is a Chain the links
of which have been forged of diff-
erent dikes, at different prices, and by diff-
erent people.

10 Cochran's Canal proper
is nominally $2\frac{1}{2}$ feet below mean tide,
the Doogooruz cut was dug except
in the backwater there, to about 3 feet
below the same standard, whilst the
cut off of the so called Beach Estuary
of my memory some one were drawn
down to 4 feet, except that at Pu-
loot where the soil was a kind of
fluid sand.

11 It was however never
intended that these various cuts, or
the backwaters which they com-
municated and which in some instances
are shallower than the cuts themselves,
should remain as I have described
them; they were all hereafter to be
deepened down to a uniform depth
of $4\frac{1}{2}$ feet, and the sills of the Shedding
Coopers, and Amalies, Locks were

respectively placed and planned on a level suitable to the depth required in a first class communication -

12 Finally with respect to the abandonment of the present line, from Pulicat to Madras, I agree with him in wishing to abandon 12 miles out of the 21, but I do not approve of the line he selects -

13 What he means by "taking a line from Madras to Pulicat which shall be comparatively straight, hardly touch a backwater, and not be interfered with by any drainage," is to me perfectly inapplicable

14 There is the drainage of something like 2000 square miles of country to be crossed between Pulicat and the Presidency; this drainage comes down for the most part in the beds of the Coartilia & Turnaveram rivers and must go to the sea through his or any

other

598
other coast Canal in two or three places -

15 He takes his proposed line, skirting the sea through a high uneven tract of sand, with which I am well acquainted & which also has evidently been under Captain Collyers personal inspection. I quite agree with the Superintending Central Circle, and entertain the most unfavorable opinion of the possibility of the successful or economical construction of a Canal along that tract -

16 The scheme projected by me takes the new line so as to skirt the backwaters, but isolated from them, as far as Ambaries lock, then by dredging the existing Estuary to Sheddiveopuram; the remaining 25 miles can of course be laid bare in the dry weather and excavated down to the site of the lock, ^{last} mentioned.

17 On both West & East Banks project -

project. and since the floods of the
Harnoveram and Cortelhar rivers
must go to sea through our lines.

18 By this it will ap-
pear, as I have before observed, that,
with the exception of the abandon-
ment of the whole first 24 miles
of navigation which he proposes, and
to which I can only partly agree,
there is no great radical difference
between Lieutenant Sankey's views
and those entertained by me; we
both advocate a tidal Canal
more or less parallel to the line of
Coast of about 5 feet in depth; he
a tidal Canal without locks
& one which may be provided
with locks after it has been for
some time in operation without
them -

19 I do not think
that Mr Sankey could have been
acquainted with any opinion re-
specting locks in tidal Canals
where

Letter No 219
of 1856

618
where the rise and fall of the
tide is but little, nor could he
have looked over the plan, estimate
and report for cutting a fresh line
of Canal from Tuluat to the En-
more backwater -

20 Easy as it is to show
that there is nothing peculiarly novel
in the views of the late Superinten-
dent of the Eastern Coast Canal,
it is very different with those enter-
tained by Major Sawford, who
distinctly asserts that the establish-
ment of a first class tidal Canal,
owing to the occurrence of sand
ridges or swamps, natural obstacles
to a greater or less degree insur-
mountable and defying all Engineering
remedies, cannot be accomplished
at a moderate cost or with the
prospect of permanent advantage,
the difficulty of the plan being
out of proportion to any advantage
derivable from it - and who further
asserts

asserts that it is his belief that all permanent improvement of backwater navigation is impracticable.

21 Mistaking, Genl Sankey's scheme, he says that he agrees with that Officer in recommending the Establishment of a perfectly formed Canal not dependent on the sea or the backwaters for its supply, but fed by great fresh water reservoirs; this recommendation, however is only from an Engineering point of view, as he doubts whether such a Canal would be profitable.

Para 8 of
Major Sawford's
letter

22 It is most difficult for one so much junior as myself to Major Sawford, and who has had the opportunity of seeing and admiring works that have been carried out by him, to say that in my opinion he is mistaken and has passed a premature opinion on the Coast Canal. But I honestly think he has.

23 I think that he judges from what exists, from what has been done at Madras, and not from what has

37
has been done elsewhere and may be done here.

24 The 70 miles of Canal are a patchwork - bits done here and there on insufficient estimates, without the employment of a single steam dredge, the whole amount spent being less than 1/10 £. a mile, and then because boats of considerable depth are unable to ply on the Canal all the year round, it is condemned and the improvement of the navigation up to a high standard is declared an impossibility.

25 Even the Govt assigns as a reason why more money was not expended on this work, that its success had not justified a larger expenditure, but surely that a Canal does not become a perfect means of communication under a trifling expenditure is no valid reason why funds should be dealt out sparingly to it, but rather a reason why a liberal expenditure should be undergone -

That

26. That tidal Canals exist
in other Countries prima facie reason
why their construction here should be
no impossibility: the termination of
the Canal de Sanquedoc passes along
Backwaters and alluvial marshes
from Agde to Cette taking its course
for the last 10 miles through the lac Than
(a perfect Pulicat Lake) and imbedded
where that lagoon is shallow; the
Canal from Lake Pontchartrain to
New Orleans is quite similar to Co-
chinine Canals, except that it has no
lock nor masonry drainage inlets,
Lake Pontchartrain being a salt
water lagoon as shallow as the Pulicat
Lake.

27. These instances, and in
neither of the localities is there any per-
ceptible rise and fall of tide, show
that excavations through backwaters
are not impossible.

28. I am not personally
acquainted with a tidal Canal passing
through sand ridges such as that to
the

151
the south of Sadras, but understand
that such works exist in Les Landes
and on the Coast of Holland.

29. I see nothing to prevent
a Coast Canal being established ex-
cept what time and money can over-
come.

30. I will however say
that I am quite of Major Saugrads
opinion that a fresh water Canal, quite
isolated and supplied from reservoirs
would be preferable to a tidal one,
were it not that the expense, the en-
gineering difficulties, and the time it
would take to execute are grievously
against such a work.

31. Every drop of water falling
on the Eastern Ghats would have to be
conveyed under it through masonry
works, and what the extent of these
would be. can be gathered from the
present water way through the Northern
Road from the Presidency to Bellary.

32. It would not be a
Canal like the so called high
level

level channels in the Godavary and Krishna-R^r, able to advance in a tolerably direct line without either much cutting or embanking and — through an alluvial soil, but would either wash greatly, or would have to pay for directness at the cost of heavy cutting or extensive tunnelling —

33 I also with Major — Sawford doubt much whether such a line would be a profitable one; this, in my opinion, too expensive a scheme for a poor country like — Madras to undertake.

34 Having said thus much in this already too long report, will in a few words state the treatment which I consider necessary to the maintenance and progressive amendment of the 70 miles so often mentioned —

35 I would, it being provided that money was at command, lay bare and excavate to the full depth

67K
depth those portions of the line — which are easily connectable in the dry weather, such as Cochrane's Canal proper, the new line, (N^o 56 of Budget of 1856/57,) and the Sogooray Canal; at places pumping would be necessary 36

The stoppage to trade would be of no great importance, as, with the exception of salt, other articles are now, for want of water, unable to reach the Presidency during the hot weather. arrangements should be made to allow of salt being brought to Madras in large quantities, previous to the shutting up of Cochrane's Canal

37 The shutting up of the line for a couple of months yearly should be an understood thing; it is what takes place elsewhere for clearing or repair and what not infrequently takes place on first class lines owing to accidents in May last year on the Erie, owing to something of this nature, the water escaped, & 2000 barges, 4,000 horses & 5000 men and

and boys, were detained at one spot for more than six weeks.

38 Whilst these excavations were going on, dredging should be undertaken in those places where it is necessary, and should be continued until the whole line has attained a uniform depth of $4\frac{1}{2}$ feet below mean tide.

39 This with the limited quantity of labor procurable along the Coast would take several years, but, perseverance & plenty of dredging would eventually effect it; and these are my recommendations.

40 After the line has been fairly established and has been provided with the proper means of conveyance, should it deteriorate more quickly than the money it earns after paying interest on Capital expended, can neutralize, then, by all means let it be abandoned as a first class line; but after getting by it for above 20 years nearly Rs 20,000 annually, providing first for all)

all charges together with 5 per Cent on its purchase money, it should not be declared an unsatisfactory navigation, incapable of improvement, because an expenditure of a few thousand Rupees does not suddenly convert it into good order.

Bombay

24th May 1858

Given the honor to be
Signed (W. L. Chamberlain)
Coly District Magistrate &c.

(True Copy)
M. L. (Colonel)
Chief Engineer.

758
viz: 1 from Madras to Shedancooppum lock.
or Cochran's Canal.

2^d Thence to Pulicat

3^d Across the lake

4th From Somapalem to Dongorazpatam
where the Canal now terminates.

6. The first portion is artificial and connects the Cocum or rather the Notary Nullah with the Corstear backwater at Ennore; having the Shedancooppum lock at its extremity.

7. I think Lieut. Sankey underrated the value of this work; it appears that during the month of April of this year the gates were never opened, the water above having always a head however small I annex ^A statement of the difference at high and low water of each day and I would especially observe that so far as I can hear, no rain fell anywhere in the country round during the month or only near its close - nor had there been even showers since November last.

8. Lieut. Sankey proposes giving up the Canal and excavating a new one East of it: deeper than the present line is now and without a lock. But he does not observe as to the depth originally obtained, or on the small

small repairs executed in a series of years, during which the silt diminished the available depth.

9. It is a notorious fact that for a few years before the lock was built, the labor of removing the deposit was very considerable, but produced little or no effect.

10. The present Canal is cut in the lowest ground; any new one must be cut at least 5 ft and in many parts 8 or 9 ft while the present line requires deepening 2 or 3 ft at most to obtain the depth proposed - so that even if it be proved that the lock is useless it will be better to improve the old than to cut an entirely new line. Lieut. Sankey's calculations have been based altogether on human labor, but the new steam dredge lately sanctioned will I hope much facilitate the deepening of our old lines without requiring any baling or offering any obstructions to the traffic.

11. When the inland traffic is fairly diverted to the Canal, I think the terminus on the beach will be of immense advantage; but until then I do not see any use in attempting a Canal which must be cut thro' the sandy ridges on which Madras is built, and which ^{will} cost a considerable sum both for excavation and maintenance.

The

12. The 2^d division from Thediamcoffum to Pulicat is thro' a series of backwaters or cuts connecting them. the line is generally thro' the lowest ground and with scarcely any exception is only divided from the sea by a sandy beach more or less broad.

13. Through this Lieut. Sankey's new cut would be made; and I believe no man will doubt that it will be more difficult to excavate and more liable to shoal itself besides the actual additional amount of earthworks to be removed.

14. I may point to the new cuts made near Baringall and Calucree as supporting my views. they were both commenced by Lieut. Sankey and the former was nearly completed when I took charge of the Canal Dept. It has been a cause of constant trouble both ends silt up, being exposed to a cross sweep of the waves. In the latter the work was very unsatisfactory; the labourers were discontented, and we could not in any way get down more than 3 ft.; while the backwater a few yards off in the direct line to Pulicat was 5 ft. deep. I therefore took on myself to discontinue the work; which was more

more permanently stopped by the financial difficulties.

15. The shorter line and by far the most easy to make would be west of Pulicat from Baringall to the lake opposite Sonapalem and I would recommend this to your consideration if at any time the backwater is really found to be obstructed, and a new line required.

16. Lieut. Sankey proposed no alteration that I know of between Pulicat and Sonapalem.

17. From the latter place as far as Thediamcoffum a new canal was estimated for by Lieut. Chambers and excavated by that Officer and Lieut. Sankey. It is round a great bay in the lake to avoid the difficulty of cutting a direct channel across it by the only means they had; human labour.

18. The Canal is thro' sand, it was found almost impossible to dig it to the depth proposed $3\frac{1}{2}$ ft. The drainage of the land to the eastward caused great shoals in it, and the southern mouth has been cleared 5 times since it was opened in August last.

19. Here again with the dredge to be as useful as the line it will work far more effectively.

effectually across the lake than we can do round it.

20. The remainder as far as Dogonizpa-
taw requires widening and deepening. It
may possibly be an advantage to cut off this
portion of the Canal by a high bank on the
west, and this can be made from the earth
taken out of the Canal.

21. It must however be high enough
not to be overtopped, as the soil is very bad.
and I am very doubtful, whether we can
get grass to grow on it. Much of the shoal
in the Canal at this part must be attributed
to the old banks which were swept into it
by the storm in November 1856, and therefore
I am inclined to think that, if we leave it
unprotected we shall be really doing better in
as much as we shall leave nothing to be
brought in beyond the actual soil carried
in suspension by the drainage water.

22. Luke Tenkey's proposition of closing
this Canal as not being yet required while
he deepened and widened, it is now rendered
impossible by the considerable traffic coming
along it.

23. But there will be nothing easier
than to widen this to a general depth of 3 ft.
by ordinary cool labor and we can work
out the lower quantity by the steam dredge,
if it only answers the premises made for
it.

24. I may say then that Luke Tenkey's
proposition generally is not an economical one
and that experience acquired from the work
executed on his principles, tends rather to
confirm my views of adhering to the present
line and extending it to St. Louis at least,
before we expend any amount of money on
the intermediate portion; and in this the
Committee have borne me out in their report.

25. I believe I may claim the idea of
a "new Canal to be fed by fresh water
reservoirs independent of the sea" as my
own. Luke Tenkey may have recom-
mended it before me, as the Sup.
Engineer says in para 9, but I have not
been able to discover where.

26. I would here submit my rea-

for bringing this forward though I have never suggested its execution immediately; but only after we are satisfied by experience on the line from Nellore that the traffic is really so great, as to require a first class line of navigation.

27. Late, last year, I was desired by the Chief Engineer to examine the country between the Pennair and the Pichana Canals, with a view to excavating a high level Canal in extension of the latter.

28. It became manifest to me immediately that neither the Pennair nor the Pichana could supply so great a length of Canal (130 miles) during the hot weather and that we should be compelled to resort to large reservoirs to maintain the water in the Canal at a navigable height.

29. It occurred to me therefore that, if a high level Canal were advantageous north of Nellore, it would be equally

812
equally useful south of that town where there were quite as many facilities for the construction of reservoirs and the storing of water.

30. I therefore suggested that before we laid out any new plans for making a canal, either on South Sankey's or any other suggestion, we should examine the line for this and the practicability both of constructing, and filling large reservoirs, which would be highly valuable for irrigation as well as navigation.

31. I may say that I have incidentally mentioned this idea in other reports when I observed that the present Eastern Coast Canal did not touch on any town or village of the smallest importance.

32. It runs thro' backwaters or the salt swamps connecting them. There is no cultivation on its banks. The people who live in its neighbourhood are poor and of the

the lowest order. - They cannot buy or build boats - they fish on Catamarans; their cheapest carriage is on their own backs.

33. The banks in the lake afford shells for lime; the forests, scattered along the coast, woods; which are collected and stored by men almost wild; purchased and carried away by a monopolizing brotherhood of Madras merchants.

34. There is not a single road by which a cart can reach the water side - Lookorpet, the nearest point on the Trunk road to the Canal, or its feeder, belongs to the Zeminder of Venkatacherry - he levies a toll on all firewood cut in his lands, and thence it passes free. I believe he always taxed all other exports; & hence it is, I doubt not that nothing leaves the road and takes the route by the Canal.

35. Before the Canal is condemned I would beg that it may be extended at least to Ristnapatnam or even to the Sornamookery and

and a road made from there to Godoor where the roads from Cuddalore and Nellore to Madras meet.

36. I do not foresee any difficulty in making a Canal 4 ft deep from Dargamuzpatnam to Ristnapatnam and I hope we might do it easily in two years, and if the traffic be not then diverted from the road, I think there will be some grounds for refusing to extend it.

37. But I must return to the project for the high level Canal as the Superintendent Engineer para 10. appears to think that it will afford facilities of construction, greater than on the tidal line in certain points.

38. I see no better hope of coping with the Pondicherry sand at a high level than I do on the tidal line; and if the sand cuttings are really impossible I fear the line must stop 8 miles north of Pondicherry but still I think that this length - 80 miles of Canal would be found very useful and valuable. I believe the

Small

Small portion near Sadras is not difficult if we follow the inland line which I have always advocated.

39. This however does not apply to the Northern branch; and I think that it would afford a fairer line than that to the South.

40. From my own observations to the north however, I am inclined to advocate the tidal canal.

41. I find that the contour line is a very winding one as far as my survey of it goes; and to the eye the whole country appears of the same nature.

42. Stony hills of small elevation running into the generally flat plain which borders the sea with intervals of deep valleys which will require either high embankments or considerable circuits.

43. The former will probably be the best as by carrying the canal between two banks we turn the valley ^{above} into a tank; and this may generally be done without any loss to cultivation but into the

the details of this; I cannot enter till the Survey is further advanced.

44. I may however mention that the strip of land which we shall benefit by such a canal is very narrow; and all Ramapatnam disappears altogether and becomes a mole of the Gundlacumman is almost all lost.

45. Large reservoirs will certainly be required, as we cannot depend on the Pennair for any water after January if even so late; and it is I believe impossible for the District to find a canal of 165 miles requiring 80,000 yards a day for evaporation alone.

46. The drainage of the country between Yellore and Ramapatnam appears to flow completely over the land from west to east. There are no streams of any size; all are intercepted by the back, forming lagoons; and vent themselves by one or more mouths at considerable distances from each other.

47. I look on this as rather a disadvantage

advantage as it produces a current
of some velocity along the canal; while
the deposit after crossing is flat a plain
must be very little and not difficult
to remove each season.

48 From my present knowledge
therefore I should suggest that the canal
be extended to Tistna patauni on the low
level - we shall I hope there receive the
traffic from Nellore which is felt from
Cuddalore, Ongole, and even Hyderabad.

49 The canal from Nellore to
Tistna patauni is already a portion of the
Pennyair Annicut project, and I think it
would be advantageous as well as econo-
-mical to make it navigable at once.

50 To the South it should be
carried into the Palar, and a branch road
constructed thence to the Trunk road
as the bandies will find a good return
load from the large salt pans at Cherpur
Chunampett and Mercanum.

51 I believe that we may maintain
the present canal in a very fair condition
with

81
with only the allotted sum for repair.
I judge from the experience of the past
year during which we have had less
than the average fall of rain and
only half the amount usually allowed
has been expended on both side
repairs.

52 Of ^{Rs} 11000 the maintenance a-
-lowance only 7391 Rs. was apportioned
to the Canal, and of that again, I ex-
-pended 3246 Rs. in clearing a part
the South Canal which had been pre-
-sented originally.

53 I cannot speak from
as to the relative cost of carriage by land
by sea. It may be that it would cost
less to a ship to touch at Cuddalore
had there as it is somewhat on her
home, but I am doubtful even of
that.

54 (During the South west
-son I think we may fairly allow
it will increase the length of the voyage
by 4 days; and require the extra
-penditure

expenditure on port dues. I cannot say whether this will amount to 2 pie per ton per mile.

55. But if it be doubtful in the case of a port south of Madras, I think it is certainly a loss when the port is to the north; since there is the additional journey, from, and to or nearly to Madras.

E. C. Canal
Supt^r Office
Madras
26 May 1850.

I have the honor to be
Signed, F. J. Motley,
Supt^r of the E. C. Canal

(True Copy)

Mr. Asst. Colonel
Chief Engineer

Process of Correspondence which has taken place since the Order of Feb 8. 1856 dated 11 Aug: 1857 regarding the Eastern Canal.

The Committee convened in Minn: House: 8.15.56 dated 11 Aug: 1857 to consider and report on the views set forth by Sir John Lubbock & Co. in regard to the present state of the S. C. Canal and the new Cut proposed by that officer. The Chief Eng. addressed the Committee under date the 16th Nov: following on the subject which had been placed in their hands.

Their communication however did not dispose of the general question which had been submitted to them but was addressed to particular points only of more immediate importance.

The Com^{ee} considered the present Canal sufficient for its intended object, the provision of cheap transport and thought that any proposed

Letter to Chief Eng. d 15 Apl: 1857. & entered in M. H. 11 Aug: 1857 No 1560.

In Minn: House: 29 Jan: 1858 No 106.

Copy in a letter to Eng. Com: of M. H. Aug: 1857 No 1526.

Enclosure in a letter

From the Chief Engineer

To the Secretary to Govt.

MS. A.

Dated 25th March 1857

MS. A. 1857/18

Copy of a letter from the Chief Eng. to the Secretary to Govt. regarding the Eastern Canal. The letter is dated 15 April 1857 and is addressed to the Secretary to Govt. The letter is in the handwriting of the Chief Engineer.

proposition for deepening &
reconstructing the Canal
at considerable expense,
in the manner suggested
by Lieut. Sankar, would
be a mistake and opposed
to sound principle.

The points to which
attention was more partic-
ularly drawn were the
want of approaches to
the Canal communicating
with the interior of the
Country, and of landing
places in Madras.

The Chief Engineer
did not coincide with
the views expressed by the
Com^{ee} as to the means to
be taken for connecting
the terminus at Doorga-
raupatam with the
Main Road - being of
opinion that the com-
pletion of the plan proposed
Canal communication to
Kistnapatam will more
effectually & with greater
advantage meet the
object contemplated by
the Com^{ee}.

The Govt. took the
same view.

Proc. of Chief Engr.
21st Nov. 1857 No. 5206.

Proc. of Com^{ee} 29th Aug 1858
No. 168

Proc. of Com^{ee}
11 May 1858 No. 1900.

as the Chief Engineer - and
remarked that they will
be happy to authorize the
extension of the Canal to
Kistnapatam as soon as
expenditure for the purpose
can be incurred.

The remaining recom-
mendations of the Com^{ee}
were the establishment
of landing places in Madras
- the connexion of the
Southern Canal with the
Coorn & Palam - the con-
struction of a Road from the
Canal's Southern end to the
Great Southern Road - and its
extension to the Palam
with a Road from this line
to Madras.

The Govt. considered
these proposals of great
importance and have
called upon the Chief
Engineer for estimates of
cost and sketches in
elucidation of the subject.

On the 13th April
1858 Major Lawford,
Officer in charge of the
Central Office of Public
Works, submitted a report
for "early confirmation or
refutation" his views on

the subject of the Eastern
Coast Canal.

Govt. stated in reply
that they would await
the receipt of the Chief
Engineers opinion on Major
Lawford's views.

With respect to
landing places - Only one
will be necessary, and
Govt. in agreeing the Chief
Engr. to immediately fix
on the site which will
be most generally conve-
nient - and make a fur-
ther report to Govt. have
suggested two spots -
one near to the house
lately occupied by Sir
R. Montgomery - and the
other in the vicinity of
Col. Reid's house.

McCowan 3rd May 1857
145-67

Mem of Com. 29 Sep 57
No 1847

21st April 1857

N^o 1022

P.W.S.
952

Extract from the Minutes of Consultation
Under date the 2nd ^{May} April 1859

Read the following
letter from the Chief
Engineer.

(Here entered 25 March 59 1858)

These papers re-
late to a proposal which
was laid before Govern-
ment two years ago for a
new method of dealing
with the Northern Canal.
It is not necessary to ex-
amine them in very minute
detail; for, bulky as they
are, the main question
which they discuss is
confined within narrow
limits.

In May 1857 the
Chief

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Chief Engineer placed be-
fore Govt a long ~~and~~
elaborate paper by Lt
Sankar, then Superin-
tendent of the East Coast
Canal, in which he dwelt
strongly on the defects and
imperfections of the Canal
from Mithras to Soorgarany,
pratham (70 miles north) and
advocated what he called
(Para 15) a new theory of
construction, but the prac-
tical effect of which would
be simply to widen and
deepen the Canal; with
its entire abandonment
for a considerable part
of the distance, and the
excavation of a new Ca-
nal in its place. Lieut.
Sankar estimated the
cost of his proposed im-
provements at 7090 Rupees
a mile (Para 40) or Rs 4,96,300
for

Ex. Am. Com. Aug 11/07
Paras.

Ex. Am. Com. Aug 11/07
Paras.
Lieut. Sankar, in his
Report of 1890

971
the seventy miles, but
other Engineer Officers
who have considered
his plan are of opinion
that the cost would be
fully 10,000 Rupees a
mile, or seven lakhs
for the entire distance.
3 The Chief Engineer
did not support Lt
Sankar's views and they
were condemned also
by Captain Collyer,
Superintending Engineer
Northern Circle, who
was well acquainted
with the Canal. Govt
however appointed a com-
mittee to report upon it.
The Committee made a
preliminary report
chiefly on subordinate
points, but in it
with that Report they stated
very concisely (Para 3) their
opinions

dissent from Lt. Sankey's
views. They never
made a full Report
on the general question,
only deferring that till
they should have been
able to inspect the
whole canal, and it
appears that they were
separated by various
causes, before they could
carry that design into
effect. The Chief Engineer,
however, ^{has} now sent up
a number of papers
~~some of them by members~~
of the Committee in which
Lieut. Sankey's project
is discussed. Besides
the papers by two
members of the Com-
mittee, viz. one by Colonel
A. T. Cotton and two by Lt.
Colonel Lawford, ~~and~~
there are others ~~in~~

911
by Major Birdwood, present
Superintending Engineer
Centre Canal, by Captain
Chambers formerly Super-
intendent of East Coast
Canal and now District
Engineer of District Divi-
sion, and by Lieutenant
J. S. Moberly who at
the time of writing it
was Superintendent of
the East Coast Canal.

4. Of all the Officers
who have given an
opinion on the subject
the only one who agrees
with Lieutenant Sankey
is Colonel Lawford, ~~in~~
who appears even to
go beyond him, advising
that the Coast Canal
should be made inde-
pendent of sea and
backwater.

1. Chief Eng^r March 15. 1858.

backwaters, and be supplied
by great fresh water
reservoirs. In subse-
quent Parag (9 to 12)
he gives his reasons
for this opinion; and
he afterwards repeats it
in Para 14, adding how-
ever that he greatly
doubts whether such
a Canal would be a
profitable undertaking.

5. The other officers
are quite at issue with
Colonel Lawford. Colonel
Cotton's paper deals
with the general question
whether it is much
beneficial in the
existing state of India
and with the very
limited

Para 8.

1017
limited means at
the command of
Government, to make
perfect works of very
limited extent, or to
make efficient though
imperfect works,
reaching over double
or treble the distance.
He strongly advocates
the latter; and the
Governor in Council
agrees with him, deem-
ing it of far greater
importance in the
present condition
of this country
as respects the
means of communication

to establish them effective.
-ly over large areas
than perfectly over much
more limited.

6 Captain Chambers
treats the subject
more in detail,
but still with
much breadth and
comprehensiveness; he
replies convincingly
to both Lieutenant
Sarkis and Colonel
Lawford, on the more
salient points of
their schemes or
opinions. Lieu-
tenant Moberly's
observations

Colonel Cotton's remarks
Para 3

103 R
observations are chiefly
practical, and bearing
on the actual localities
and circumstances. He
condemns Lt Sarkis's
opinions and advocates
the improvement of the
present canal, but thinks
that ultimately one of
the kind proposed by
Colonel Lawford may
be proper when the tri-
-fic shall be sufficient
ly large.

7 The Governor in
Council has no diffi-
culty or hesitation in
forming a judgment on
the matter. The present
canal in its defective
state conveys 12,000 tons
a year at a cost of 3 pice
a ton a mile. Colonel
Cotton estimates the
saving

saving on this amount
of work, in comparison
with ordinary land
carriage, at $7\frac{1}{2}$ lacks
of Rupees. The canal also
yields in tolls the sum
of Rupees 32,000 yearly,
being more than suffi-
cient to pay its expenses
and keep it in repair.
With the enormous and
growing want of means of
transport throughout
the country, the Govern-
ment would regard it as
a misapplication of money
to lay out seven lacks of
Rupees in improving this
canal, which in its pre-
sent state does efficient ser-
vice. They are aware
however that its usefulness
is now materially de-
minished by causes which
might be removed at com-
paratively very small cost;

1857
for which the necessary
funds are actually provi-
ded by the canal itself,
and they propose to deal
with that subject in a
separate order.

AA

10 Copies to the Chief Secy. Disps: 3^d
1 - Col. A. Cotton

Cons 3. March/57 No 10 & 11.
-u-11th Aug^r-u-u-91 & 92
-u-2nd Feb^r/58.-u-44 & 45.
-u-11th May-u-u-97 & 98.

Copy in a Letter to Genl. Laid
of the 11th May/61 No 26.

Public Works 1859 Sept^r.
Cons 3. May 1859

No 1022.

Pro. of the Madras Gov^t
22nd May/59.

From the Chief Engr^r of 13th
June/59 C. 1054/1016. 24th June
95-96.

Q
Sipping observations
on Lieutenant Sankar's
proposed new line of Canal
between Madras to Doorga
raupatam.

No 46 & 47

21st April 1827