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MADRAS RECORD OFFICE.

Government of Madras.

Public Works
DEPARTMENT.

G.O. No.

Press
Mis.

Dated

18

Not to be folded or roughly handled

No. 71. Read the following Extract from the Proceedings of the Chief Engineer, dated 5th January 1858, No. 6105.

Read the following Minute by Major LAWFORD, Superintending Engineer, Southern Circle, on the Groynes at Tranquebar, dated 29th December 1857.

The state of the Beach at Tranquebar as reported by Major Birdwood, should in my opinion, be brought to the immediate notice of Government as the groynes have now stood for five years without producing that permanent effect which was expected, and the expense of repairing and improving them seems likely to be indefinite.

2. I saw the Beach at Tranquebar first in 1842 and again in 1845, and I have no hesitation in saying that the encroachments of the Sea which were then apparent, have not been stopped, but are advancing slowly but surely to the serious injury of the Town, the two great bulwarks of which are the Kings and Queen's Bastions at the two extremities both Danish works.

3. The ancient Pagoda, a little to the North of the Queen's Bastion, which was for the first time damaged in 1856, has now, it seems, lost its tower the water worn stones of which must have stood for three centuries and the next monsoon will probably cause greater havoc.

4. I do not believe that the length of the groynes has any material effect on their utility, for I have seen the longest, which was carried 90 yards from the Beach, stripped of sand up to its inner extremity. I consider that these works at Tranquebar have failed to produce any permanent result, for although they undoubtedly have, at certain times, caused a great accumulation of sand to Windward, that is, when the current has been steadily parallel to the coast, yet they have never retained the Beach when from the force of the Wind, or perhaps sand banks at Sea there has been an *inshore current* driving the waves along these projections and actually increasing their violence on the Lee side of the groynes.

5. These opinions are not the result of theory, but of careful observation along the coast South of Madras, and I know of no reason why any difference of effect should be produced elsewhere.

A continuous Bulwark of masonry *protected by rough stones*, has resisted all encroachment of the Sea at Tranquebar as at Madras, which, as far as I can see the groynes have not done, and on those grounds I do not recommend any further outlay on those at Tranquebar, but the re-construction of the ruined Sea Wall along the Town on the same plan as De'Havilands, bulwark at Madras.

Extract from the General Observation made by Major W. J. BIRDWOOD, District Engineer of Tanjore, during the month of November 1857.

Tranquebar Groynes.

The undermentioned shews the dimensions of the Groynes at present.

No. 7—46 yards long. 3 yards broad at top. 3 yards height at head.	} Opposite the Custom House.
No. 6—39 yards long. 3 yards broad at top. 3 yards height at head.	
No. 5—52 yards long. 3 yards broad at top. 5 yards height at head.	} At end of Queen's Bastion.
No. 4—30 yards long. 3 yards broad at top. 2½ yards height at head.	
No. 3—90 yards long. 3 yards broad at top. 6 yards height at head.	} Opposite the Town.
No. 2—40 yards long. 3 yards broad at top. 3 yards height at head.	
No. 1—23 yards long. 3 yards broad at top. 5 yards height at head.	} At end of King's Bastion.

Fort Saint George, Public Works Consultation of 26th January 1858.

And the accompanying plan exhibits the usual height of water during the hot months and that during the late high winds and very heavy surf when it reached the Custom House Verandah; the wooden frame to No. 3 has slipped considerably, No. 5 has slipped also but not so much.

No doubt a great accumulation of sand takes place to the north of the Groynes during the prevalence of the S. W. and S. Winds from the sweeping current along shore and at that season a great deal is effected towards creating a beach as is abundantly proved, viz., that the mean extent seaward of beach formed is as nearly as possible proportioned to the mean length of the adjacent Groynes (for they are not of the same length, one indeed opposite the old Pagoda being very short) but during the N. E. Monsoon the same process does not take place the sand if swept along the coast is not deposited to the south, or leeward of the Groynes on the contrary, the action of the surf being more direct during the high winds at that season of the year, tends to the clearing away and carrying out to Sea, the accumulation of beach, that has been formed during the prevalence of the Southerly winds.

From what I can learn, the Sea has not risen higher this year, than last, there has been a little erosion here and there but certainly, no permanent beach, has been formed.

The distance between the larger Groynes is too great and the intermediate ones are too short to have any effect where the action of the surf is almost direct as has been proved by the removal of the sand, or destruction of the beach formed during the last Southerly winds, this might be remedied, I think, and a beach formed, which a moderate storm will not remove, by lengthening the Groynes sufficient for the protection of and prevention of, further encroachments on the Seaface.

I would therefore recommend that as they have not had fair play up to this time, acting very well, certainly, during the prevalence of the Southerly and S. Westerly winds, but quite the reverse, during the N. E. Monsoon, that the intermediate Groynes should be lengthened, they would then support each other, better, and the action of the surf during the prevalence of the N. E. Winds on the beach would be rendered less violent, and the deposit, that had taken place during the Southerly winds not so much disturbed as at present which by increasing the length of the Groynes too, would of course be greater.

I have therefore prepared the undermentioned estimates, for insertion in the ordinary for the next season, including small items for the lengthening the large Groynes sufficient only for the re-setting the wooden frames, and repairing other parts (with some stone-work) that have slipped and bedded themselves in the sand, in front of the Queen's Bastion and Northern face of the Groynes abutting on it.

Ordinary Estimate for 1858.

Amount of Estimate.....Rupees 7,000

The above estimate may appear large but it must be borne in mind that it is the price of the materials, and not the quantity of work, that swells the amount during the present season although we have not had a gale yet the wind has been high and the surf heavy at times, the waves have washed up to the foot of the Custom House Verandah, the Pagoda compound wall, slightly to the rear of the Queen's Bastion and undermined the Goprums of the Pagoda, a great portion of which has fallen since I prepared the estimate.

(True Extract.)

(Signed) P. O'CONNELL, Lieutenant,
Assistant to the Chief Engineer.

1. Resolved that a copy of the foregoing Minute by the Superintending Engineer Southern Circle, together with the District Engineer's remarks on which it has been drawn up be at once submitted for the early orders of Government.

2. The Chief Engineer is not a little embarrassed in dealing with the subject of arresting the erosive action of the Ocean currents and the abrasion of the surf at Tranquebar, when the apparent parallel case of action on the same coast at Madras has committed him to the advocacy of professional measures in almost exact conformity with the treatment now recommended by the Local District Engineer, and altogether disapproved by the experienced Superintending Engineer of the Circle.

Fort Saint George, Public Works Consultation of 26th January 1858.

3. Perhaps there is no more painful duty belonging to the Head of a Central office of Public Works, than that now devolving on the Chief Engineer of setting in array before the Government conflicting opinions a like supported by Officers of admitted ability and experience.

4. In the present instance Major Lawford's case is strengthened as he must needs have made the sacrifice of his previous convictions, for he was a member of the special Committee of select Officers who in the year 1850 were assembled at Tranquebar for the purpose of advising the Government respecting the most suitable protective measures to be adopted in the then state of the beach at our recently acquired possessions at Tranquebar.

5. Experience however often admonishes us, that certain principles of construction, which from having been frequently adopted with success have come to be considered generally applicable, cannot be depended upon in every case and it is perhaps to be concluded now that owing to some local peculiarity in the action of the sea at Tranquebar, the system of carrying out groynes which has proved so successful at Vizagapatam and it may be added, successful to some degree at least at Madras also, has failed altogether at Tranquebar.

6. It cannot however be considered otherwise than retrogressive in professional practice to recur to the ancient system of direct defence of an eroded Coast when the more economical method of diverting the attacks of currents, and waves, through the agency of numerous groynes, has found general acceptance amongst scientific practitioners, nor whilst making every concession to Major Lawford's local knowledge at Tranquebar in particular, and fully recognising both his great experience and general ability is it to be concealed that the faith of a still more experienced Officer, Colonel A. Cotton Commandant of Engineers continues to be unshaken in the eventual efficacy of the action however deferred or irregular, of perpendicular instead of parallel defences.

7. The subject of groynes generally has been so repeatedly and so largely discussed in connection with the establishment of these works at Madras, that there remains nothing of novelty to be represented on the present occasion of dissonance in professional opinion. It is perhaps questionable however whether, considerable and certainly Minute as Major Lawford's acquaintance with the localities at Tranquebar undoubtedly is, it yet extends over a sufficiently lengthened period to authorize a conclusively unfavorable opinion. It would appear to be not only possible but within the bounds of a reasonable probability that the persistence of a few more seasons may develop results not less satisfactory than can be practically appealed to immediately in front of the Marine Villa (so dangerously threatened in 1847, at Madras) and also at Vizagapatam.

8. There remains little more to be stated, than that the Government have before them the measures of perseverance in the groyne-system as estimated and recommended by the District Engineer and the counter project of strengthening the rough stone bulwark as advocated by the Superintending Engineer of the circle, and that it is for his Lordship in Council to promptly authorize such measures as the decision of Government may pronounce to be best fitted for immediate or early adoption.

(Signed) C. E. FABER, Colonel,
Chief Engineer.

No. 72. ORDER THEREON, No. 136; dated 26th January 1858.

1. With these Proceedings, the Chief Engineer submits the recorded opinions of Major Birdwood, District Engineer Tanjore, and of Major Lawford, Superintending Engineer Southern Circle, on the measures necessary for the protection of the Town of Tranquebar from the gradually increasing encroachment of the Sea.

2. Both of these Officers agree in opinion that the operation of the Groynes that have been carried out, has not hitherto been fully successful, no permanent results having been obtained during the five years that have elapsed since their erection, but they differ as to the steps to be now taken. Major Lawford would erect a Sea wall along the front of the town, on the same plan as DeHavilland's bulwark at Madras and make no further outlay on the Groynes, while Major Birdwood, being of opinion that the plan of Groynes has not yet had fair play, from the insufficient length of some of them, submits an estimate amounting to Rupees 7,000, for repairing the longer, and lengthening the shorter of the Groynes, which remedy, he thinks will suffice for the protection of the Sea face from further encroachment.

Fort Saint George, Public Works Consultation of 26th January 1858.

3. The Chief Engineer does not himself express any distinct opinion on the subject, but states that Colonel A. Cotton's faith in the superior efficiency of Groynes over Sea walls as a coast defence, is mistaken by the results observed at Tranquebar, and the Right Honorable the Governor in Council reposing much confidence on Colonel Cotton's professional opinion, and observing that the encroachment of the Sea is allowed by Major Lawford to be very slow, resolves to permit a further trial of the Groynes in the manner proposed by Major Birdwood, and to sanction the expenditure of Rupees 7,000 on emergency. Should this experiment eventually fail, and it be resolved to erect a Sea wall, the materials of the Groynes will all be of use for the new work, and the present expenditure will go to decrease its cost.

(Signed) H. FORBES,
Acting Secretary to Government.

58
Extract from the General observation made by
Major W. J. Birdwood District Engineer of Tanjore
during the month of November 1857

Tranquebar Groynes

The undermentioned shews the dimensions
of the Groynes at present.

- | | |
|--------------------------------|--------------------------------|
| N ^o 7-46 yards long | } opposite the
Custom House |
| 3 yards broad at top | |
| 3 yards height at Head | |
| N ^o 6-39 yards long | } opposite the Citadel |
| 3 yards broad at top | |
| 3 yards height at Head | |
| N ^o 5-52 yards long | } at end of Queens
Bastion |
| 3 yards broad at top | |
| 5 yards height at Head | |
| N ^o 4-30 yards long | } opposite Pagoda |
| 3 yards broad at top | |
| 2 1/2 yards height at Head | |
| N ^o 3-90 yards long | } opposite the Town |
| 3 yards broad at top | |
| 6 yards height at Head | |
| N ^o 2-40 yards long | |
| 3 yards broad at top | |
| 3 yards height at Head | |

№ 1—23 yards long
 3 yards broad at top } At end of Kings
 5 yards height at head } Bastion

And the accompanying Plan Exhibits the usual height of water during the hot months and that during the late high winds and very heavy surf when it reached the Custom House Verandah; the wooden frame to № 3 has slipped considerably, № 5 has slipped also but not so much.

No doubt a great accumulation of sand takes place to the North of the Groyne during the prevalence of the S. W. and S. Winds from the sweeping current along shore and at that season a great deal is effected towards creating a Beach as is abundantly proved, viz, that the mean extent seaward of Beach formed is as nearly as possible proportioned to the mean length of the adjacent Groyne (for they are not of the same length, one indeed opposite the old Pagoda being very short / but during the N. E. Monsoon the

the same process does not take place the sand if swept along the coast is not deposited to the South, or toward of the Groyne on the contrary, the action of the Surf being more direct during the high winds at that season of the year, tends to the clearing away and carrying out to sea, the accumulation or Beach, that has been formed during the prevalence of the southerly winds.

From what I can learn, the sea has not risen higher this year, than last, there has been a little erosion here and there but certainly, no permanent Beach, has been formed.

The distance between the larger Groyne is too great and the intermediate ones are too short to have any effect where the action of the Surf is almost direct as has been proved by the removal of the sand, or destruction

destruction of the Beach formed during the last southerly winds, this might be remedied, I think, and a Beach formed, which a moderate storm will not remove, by lengthening the groynes sufficient for the protection of and prevention of, further encroachments on the sea face.

I would therefore recommend that as they have not had fair play up to this time, acting very well, certainly, during the prevalence of the southerly and S. westerly winds, but quite the reverse, during the N.E. monsoon, that the intermediate groynes should be lengthened - they would then support each other, better, and the action of the surf during the prevalence of the N.E. Winds on the Beach would be rendered less violent, and the deposit, that had taken place during the southerly winds not so much disturbed as at present which by increasing the length of the groynes

groynes too, would of course be greater.

I have therefore prepared the undermentioned estimates, for insertion in the ordinary for the next season - including small items for the lengthening the large groynes sufficient only for the settling the wooden frames, and repairing other parts with some stone work that have slipped and bedded themselves in the sand, in front of the Queen's Pavilion and Northern face of the groynes abutting on it.

Ordinary Estimate for 1858

Amount of Estimate Rupees 7000 - - -

The above Estimate may appear large but it must be borne in mind that it is the price of the materials, and not the quantity of work, that swells the amount. During the present season although we have not had a gale yet the wind has been high and the surf heavy at times, the waves have washed up to the foot of the custom House Verandah, the

Pagoda

Pagoda Compound wall, slightly to the
rear of the Queen's Bastion and under-
mined the supports of the Pagoda, a
great portion of which has fallen down.
I prepared the Estimate.

(True Extract)

C. V. M. Licut.
Apt to the, Chief Engineer

Extract from the Proceedings of the Chief Engineer
in the Department of Public Works.

Under date the 5 January 1858.

Read the following
Minute by Major Lawford Superintending
Engineer Southern Circle, on the groynes
at Tranquebar.

The state of the Beach at Tranquebar as reported by Major Birdwood, should in my opinion, be brought to the immediate notice of Government as the groynes have now stood for five years without producing that permanent effect which was expected, and the expense of repairing and improving them seems likely to be indefinite.

2. I saw the Beach at Tranquebar first in 1842 and again in 1845, and I have no hesitation in saying that the encroachment of the Sea which were then apparent, have not been stopped, but are advancing slowly but surely to the serious injury of the Town, the two great bulwarks of which are the Kings and Queens Bastions at the two extremities in both Danish works.

3. The Ancient Pagoda, a little

to

See a letter from
the Chief Engineer to the
Secy to Govt P.W.D. under
date the 5 January 1858
N^o 6405.
1858/58
Extract from the
Mem^o to Government made
by the Secy to Govt
during Feb 1859.

to the north of the Queen's Bastion, which was for the first time damaged in 1856, has now, it seems, lost its tower, the water worn stones of which must have stood for three centuries and the next monsoon will probably cause greater havoc.

4. I do not believe that the length of the groynes has any material effect on their utility, for I have seen the longest, which was carried 90 yards from the Beach, stripped of sand up to its inner extremity. I consider that these works at Tranquebar have failed to produce any permanent result, for although they undoubtedly have, at certain times, caused a great accumulation of sand to windward, that is, when the current has been steadily parallel to the coast, yet they have never retained the Beach when from the force of the Wind, or perhaps sand banks at Sea there has been an inshore current driving the waves along these projections and actually increasing their violence on the Lee side of the groynes.

5. These opinions are not the result of theory, but of careful observation along the Coast South of Madras, and I know of no reason why any difference of effect should be produced elsewhere.

A

Continuous Bulwark of masonry protected by rough stones, has resisted all encroachment of the sea at Tranquebar as at Madras, which, as far as I can see the groynes have not done, and on those grounds I do not recommend any further outlay on those at Tranquebar, but the reconstruction of the ruined Sea Wall along the Town on the same plan as in Offavillands bulwark at Madras.

Sup^t. Eng^r Office Circle
29th December 1857

Signed / C. Lawford
Sup^t. Eng^r Southern Circle

1. Resolved that a Copy of the foregoing Memo by the Superintending Engineer Southern Circle together with ~~reference~~ ^{the} District Engineer's remarks on which it has been drawn up be at once submitted for the early orders of Government.

2. The Chief Engineer is not a little embarrassed in dealing with the subject of arresting the erosive action of the ocean currents and the abrasion of the surf at Tranquebar, when the apparent parallel case of action on the same Coast at Madras has committed him to the advocacy of professional measures

measures in almost exact conformity with the treatment now recommended by the Local District Engineer & altogether disapproved by the experienced Superintending Engineer of the Circle.

3. Perhaps there is no more painful duty belonging to the Head of a Central Office of Public Works than that now devolving on the Chief Engineer of setting in array before the Government conflicting opinions alike supported by officers of admitted ability & experience.

4. In the present instance Major Linfoords case is strengthened as he must needs have made the sacrifice of his previous convictions, for he was a Member of the Special Committee of Select Officers who in the year 1850 were assembled at Tringuebar for the purpose of advising the Government respecting the most suitable protective measures to be adopted in the then state of the beach at our recently acquired possessions at Tringuebar.

5. Experience however often admonishes us, that certain principles of construction, which from having been frequently adopted with success have come to be considered generally applicable, cannot be depended upon in every case.

and

submitted by
Major Linfoords
to the
Government
for their
consideration
and
approval

Major Linfoords
is a
Member of the
Special Committee
of Select Officers

and it is perhaps to be concluded now that owing to some local peculiarity in the action of the sea at Tringuebar, the system of carrying out groynes which has proved so successful at Vijayaputram and it may be added, successful to some degree at least at Madras also, has failed altogether at Tringuebar.

It cannot however be considered otherwise than retrogressive in professional practice to recur to the ancient system of direct defence of an eroded coast when the more economical method of diverting the attacks of currents, and waves, through the agency of numerous groins, has found general acceptance amongst scientific practitioners, nor whilst making every concession to Major Linfoords local knowledge at Tringuebar in particular, and fully recognising both his great experience and general ability, is it to be concealed that the faith of a still more experienced officer, Colonel Cotton Commandant of Engineers continues to be unshaken in the eventual efficacy of the action however deferred or irregular, of perpendicular instead of parallel defences.

The

7. The subject of groins generally has been so repeatedly and so largely discussed in connection with the establishment of these works at Madras, that there remains nothing of novelty to be represented on the present occasion of dissonance in professional opinion. It is perhaps questionable however whether, Considerable and certainly minute as Major Laforeys acquaintance with the localities at Tranquebar undoubtedly is, it yet extends over a sufficiently lengthened period to authorize a conclusively unfavorable opinion. It would appear to be not only possible but within the bounds of a reasonable probability that the persistence of a few more seasons may develop results not less satisfactory than can be practically appealed to immediately in front of the Marine Villa (so dangerously as threatened in 1847 at Madras) and also at Vyagaputram.

8. There remains little more to be stated, than that the Government have before them the measures of perseverance in the groin system as estimated and recommended by the District Engineer

and

19.
and the counter project of strengthening the rough stone bulwark as advocated by the Superintending Engineer of the Circle, and that it is for His Lordship in Council to promptly authorize such measures as the decision of Government may pronounce to be best fitted for immediate or early adoption.

/ True Extract /

Wm Lister Colonel
Chief Engineer

To
The Secretary to Government
Public Works Department

C. C.

P. W. D. 1828
 The Government
 will be pleased to
 have the
 reference
 The Chief Engineer
 does not offer a
 decided opinion,
 but as the
 first administration
 has been
 of the same

27th Nov 1828
 Dec 1st 1828

The Chief Engineer

The Chief Engineer

Dec 1st 1828
 Dec 6th 1828

Dec 1st 1828
 Dec 1st 1828

for the early order of
 at the same time
 the Chief Engineer
 that measure may be
 thought for immediate
 or early adaptation

Prof. D. J. D.

Guehan is very
strongly opposed to
the use of colored
papers strongly at
vocals papers
perpetrated by
the Chief Exec.
recommends further
trial in it may be
not be advisable
to send him to
District Enforcement

estimate -

No longer will
apparently result
from 2 or 3 cases
delay, and if other
all a bulwark is
formed necessary,
the street to be used
brought for the
extension of the
project, and all
be useful for

it is fornication
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25th P.M.D.
 N. 136.
 Extract from the Minutes of Consultation
 Under date the 26th January 1858 -
 Read the following
 letter from the Chief Engineer.
 (Here enter 5 January 1858 A.B. 405)

At
 the
 will

Let the proceeding
 to Chief Engineer submit
 the several opinions of
 Major Pinkwood. S. Eng.
 Major. and of Major
 Lawford. S. Eng.
 On these (note on the
 measures necessary
 for the protection of
 the town of Tranquar
 from the gradually
 increasing encroachment
 of the sea -
 - both of these
 Officers agree in opinion

that the operation of the
Engines that have been
carried out - has not
likewise been ^{fully} successful
in permanent results
having been obtained
during the five years that
have elapsed since
their erection - but
they differ as to the
steps to be now taken.

Major Langford would
erect a sea wall
along the front of the
town, on the same
plan as De Villand
barracks at Madras
and make no further
alteration on the engines,
while Major Greenwood,
being of opinion that
the plan of engines
has not yet had
fair play. from the

274
insufficiency of
force
during of time, submits
an estimate for amounting
to £20,000. for repairing
the engines, and lengthen-
ing the shorter of the
engines, which would
he thinks ~~be~~ will
suffice for the protection
of the sea face from
further encroachment.

The Ch. Eng. does
not give self & takes
any distinct opinion
on the subject, but
states that Col. A. (other)
faith in the superior
efficiency of engines
over sea walls - as
a coast defence,
is well known by the
results obtained
at Frankfort -
and the R. A. the Eng.
reposing much
confidence in Col. A.

0

Professional opinion, and
 showing that the over-
 :ment of the sea is allowed
 by Major Langford &
 his son, & resolves
 & ~~permitted~~ a further
 trial of the engines in
 the manner proposed
 by Major Birdwood, and to sanction the
 : Should this experiment expenditure of
 eventually fail, and ^{£67000 on} emergency.
 it be resolved to erect
 a sea wall, the materials
 of the engines will
 all be used for the
 sea wall, and the
 present expenditure
 will ~~be~~ go to decrease
 the estimated cost.

L.R.

18. Jan 7 1858.

LL

2 Copies to the Chief Engr
 Cwp 275

29 Jan 1858

Public Market 339 Sep 11th
Cons: 26th January.

No 136

Contract Mine: of Cons.
Bated 26th Jan 1858.

Containing the splendid
line of Refractors 1800 on emergency
as a further trial of the progress,
for the protection of the Crown
of Champagne from the gradual
increasing encroachment of the
sea.

1851 1852