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Government of Madras.

Public Works DEPARTMENT.

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Proceedings of the Madras Government, Public Works Department,
30th January 1862.

No. 163. MINUTE BY THE HONORABLE THE PRESIDENT.

NAVIGATION OF UPPER GODAVERY.

1. The Government is desirous to perfect, as far as possible, the navigation of this river, from Dowlaishwaram upwards to the Cotton districts of Berar, &c., and when I say to perfect the navigation, I mean that there should be the means of passing boats up and down during the whole year, including the dry season. Of course during the season of floods the up traffic will be delayed, but as these afford special facilities for the down traffic, it is expedient that means should be provided to pass the boats, which have come down with the freshes, up again with as little delay as possible.

2. There are two modes in which this improvement of the river may be effected. The first is that proposed by Captain Haig, which may be described in general terms to combine a system of Anicuts and Locks at the three great falls or rapids on the river, with a general improvement of the channel in those places where it is now impeded by rocks and sand banks, and (should it be wished to maintain the navigation during the dry season) with a system of reservoirs, from which a quantity of water could be poured into the river, sufficient to create an occasional or a permanent fresh, of a depth sufficient to float the craft navigating the river.

3. The second mode would be that commonly adopted in rivers, viz., to reduce the rapidity of the stream by the erection of Dams or Anicuts at different points, at which points Locks would be required to raise the boats from the level of one reach to that of another. The second scheme would of course be more expensive, but at the same time it would be more effective than the first, and would offer far greater facilities for the up traffic; while it would not offer any impediment to the down navigation.

4. The whole question, however, is complicated with that of the irrigation of the Deltas of the Godavery, and of other tracts of country, too, which might be brought within reach of the water. It is also mixed up to a certain extent with the question of the improvement of the harbour at Cocanada, which is becoming every year shallower in consequence of being the recipient of all the mud brought down by the Godavery.

5. It appears from Captain Haig's report that during the dry season the river does not bring down sufficient water to supply the wants of the Delta. If then the whole of the existing supply is made to pass through the head sluices at Dowlaishwaram into the irrigating channels, there will be a deficiency; while if any amount is taken from the river for irrigation higher up, there will be a still greater deficiency at the Delta. It is, therefore, evident that a certain amount of water must be stored. The only question will be as to the amount; this of course will depend upon the demand for water below, and in calculating this, reference must be made not merely to the actual amount of land which may be brought within the range of the existing channels, but also to the large amount which might be brought within reach of water, were an Anicut constructed as suggested by Sir Arthur Cotton, at the point where the river leaves the mountains, at about 25 miles or upwards above Dowlaishwaram. In fact, the first thing to be done is to secure a sufficient supply of water. This forms a part of Captain Haig's scheme; and it may possibly be the case that the amount of water considered by him to be sufficient to afford all reasonable facilities for the navigation of the river, might also prove sufficient to irrigate the country which might be brought within the reach of the different channels. By combining then a system of irrigation with that of the navigation of the Upper Godavery, a larger return might be secured for the money expended, than would be looked for were the whole cost of the scheme charged to the navigation: for instance, the Anicut at the outlet of the mountains, and all the channels at that high level might be charged to irrigation and a large portion also of the cost of storage of water, leaving the work to be done for navigation only, limited in amount to that which would be required to surmount the difficulties in the channel of the river itself, and such extra supplies of water as might be wanted to give depth of water generally in the main channel.

6. With reference, however, simply to the navigation, there can be no question as to the necessity of the works at the three Barriers or rapids; and the only mode of surmounting these would seem to be that proposed by Captain Haig, of cutting a canal round each, and locking up from the pool below the rapid, to the still water above it.

7. The only question then which requires to be decided before this work can be pushed forward actively, is the size of the boats for which the Locks are to be constructed.

8. In Captain Haig's detailed plan, submitted some months ago, provision was made for Locks 200 feet long and 45 feet wide. I objected then to the size of the Locks as involving an unnecessary amount of expense to say nothing of the risk. The object of Captain Haig in having such Locks was to allow the steamers to pass through them. It has, however, been suggested since by Colonel Horsley, that, if steamers were to ply between the Bariers and above and below them, the size of the Locks might be reduced to that which would suffice to pass the cargo boats, while the steamers might, if necessary, be passed up during the monsoon floods, and be permanently employed at different parts of the river.

9. This would seem to be the best plan, the expense of constructing the Canal and Locks would be very much lessened, as a diminution of the width of the Lock, involves a large reduction in the width of the canal, in the quantity of masonry, in the scantling of timber, &c., while though there may at first perhaps be a little extra expense in the employment of steamers, yet this, if any, will soon be met by the extension of the navigation. I am disposed, therefore, to think that Captain Haig should be called upon to revise his estimates for the work at the lower Barier by diminishing the section of the Canal and the size of the Lock to that which will be sufficient to pass the largest boats which are likely to be employed upon the river.

10. Before, however, the Government can fully decide upon the character of the works to be constructed at the Barriers, it will be necessary that it should be in a position to determine which of the two systems, alluded to in the early part of this Memorandum, it would be desirable to adopt; and in order to this, it will be necessary that Captain Haig should submit a plan and longitudinal section of the river, and should point out the spots at which, in case of the adoption of the second plan, it would be necessary to erect Anicuts. He will also point out any collateral advantages which would result from the construction of these Anicuts, such as the facilities thereby offered for irrigation, &c., and on the other hand he will submit an approximate estimate of the probable cost.

11. In making this estimate, he will take into consideration the probable necessity of increasing the size of the Locks, and the width of the canal at the Barriers, for it will of course be impossible to keep a steamer between each pair of Anicuts. On the other hand, as the velocity of the stream will be very much reduced, smaller steamers will have power enough to tow the boats; and the size of the Locks in the estimate should be adapted to such a class of vessels.

12. Captain Haig will consider carefully the relative advantages and disadvantages attendant upon each of the modes of improving the navigation, without any reference to the expense, which will be a separate question, and be as such considered by Government. He will look into the question as one purely professional, and having reference to the facilities which each scheme will afford to the navigation. The Government will then be in a position to decide which of the two it will be desirable to adopt.

13. The Cocanada question must be dealt with separately; but it ought to be brought forward without delay.

21st January 1862. (Signed) W. T. DENISON.

No. 164. ORDER THEREON, 30th January 1862, No. 83.

1. Captain Haig having arrived at Madras pursuant to orders, the Government resolve to call upon him to communicate his views on the subject of the navigation of the Godavery river, with reference to the following observations.

Proceedings of the Madras Government, Public Works Department,
30th January 1862.

2. The Government are desirous to perfect, as far as possible, the navigation of the Godavery river, from Dowlaishwaram upwards to the Cotton Districts of Berar; *i. e.*, they are anxious that there should be the means of passing boats up and down during the whole year, including the dry season. During the season of floods, there would of course be special facilities for the down traffic; but as the up traffic would be naturally delayed at that time, it is expedient that means should be provided to pass the boats, which have come down with the freshes, up again with as little delay as possible.

3. There are two modes in which the required improvement of the river may be effected:—

I. The first is that proposed by Captain Haig, which may be described in general terms to combine a system of Anicuts and Locks at the three great falls or rapids in the river, with a general improvement of the channel in those places where it is now impeded by rocks and sand banks, and (should it be wished to maintain the navigation during the dry season) with a system of reservoirs, from which a quantity of water could be poured into the river, sufficient to create an occasional or a permanent fresh, of a depth sufficient to float the craft navigating the river.

II. The second mode would be that commonly adopted in rivers, viz., to reduce the rapidity of the stream by the erection of Dams or Anicuts at different points, at which points Locks would be required to raise the boats from the level of one reach to that of another.

4. Of these two schemes, the second would of course be more expensive, but at the same time it would be more effective than the first, and would offer far greater facilities for the up traffic; while it would not offer any impediment to the down navigation. The whole question, however, is complicated with that of the irrigation of the Delta of the Godavery, and of other tracts of country too, which might be brought within reach of the water. It is also mixed up to a certain extent with the question of the improvement of the harbour at Cocanada, which is becoming shallower every year, in consequence of being the receptacle of all the mud brought down by the Godavery.

5. It appears from Captain Haig's report, that during the dry season the river does not bring down sufficient water to supply the wants of the Delta. If then the whole of the existing supply is made to pass through the head sluices at Dowlaishwaram into the irrigating channels issuing thence, there will be a deficiency of water; while if any amount is taken from the river for irrigation higher up, there will be a still greater deficiency at the Delta. It is, therefore, evident that a certain amount of water must be stored. The only question will be as to the amount of this storage: this of course will depend upon the demand for water below; and in calculating this, reference must be made not merely to the actual amount of land which may be brought within the range of the existing channels, but also to the large amount, which may be brought within reach of water, were an Anicut constructed at the point, as suggested by Sir Arthur Cotton, where the river leaves the mountains, at about 25 miles or upwards above Dowlaishwaram. In fact, the first thing to be done is to secure a sufficient supply of water. This forms a part of Captain Haig's scheme; and it may possibly be the case that the amount of water considered by him to be sufficient to afford all reasonable facilities for the navigation of the river might also prove sufficient to irrigate the country, which might be brought within the reach of the different channels.

6. By combining then a system of irrigation with that of the navigation of the Upper Godavery, a larger return might be secured for the money expended, than would be looked for were the whole cost of the scheme charged to the navigation alone: for instance, the Anicut at, the outlet of the mountains, and all the channels at that high level, as also a large portion of the cost of the storage of water, might be charged to irrigation, leaving the work to be done for navigation only, limited in amount to that which would be required to surmount the difficulties in the channel of the river itself, and such extra supplies of water as might be wanted to give depth of water generally in the main channel.

7. With reference, however, to the navigation simply, there can be no question as to the necessity of the works at the three Barriers* or rapids; and the only mode of surmounting these would seem to be that proposed by Captain Haig, viz., cutting a canal round each, and locking up from the pool below the rapid, to the still water above it. The only question then which requires to be decided before the work can be pushed forward actively, is the size of the boats for which the Locks are to be constructed. In Captain Haig's detailed plan submitted with the Chief Engineer's letter of the 1st May 1861, No. 41, provision was made for Locks 200 feet long and 45 feet wide. In his Minute of the 19th August 1861,† the Honorable the President objected to the size of the Locks as involving an unnecessary amount of expense to say nothing of the risk. Captain Haig's object in proposing such Locks was to allow the steamers to pass through them. It has since, however been suggested by Colonel Horsley that, if steamers are to ply between the Barriers and above and below them, the size of the Locks might be reduced to that which would suffice to pass the cargo boats, while the steamers might, if necessary, be passed up during the monsoon floods, and be permanently employed at different parts of the river. This would seem to the Government to be the best plan: the expense of constructing the Canal and Locks would be very much lessened, as a diminution of the width of the Lock would naturally cause a corresponding reduction in the width of the canal, in the quantity of masonry, in the amount of timber, &c., while though there may at first perhaps be a little extra expense in the employment of steamers, such extra expense, if any, will soon be met by returns from the extension of the navigation. The Government would wish Captain Haig, therefore, to revise his Estimates for the work at the lower Barrier by diminishing the section of the Canal and the size of the Lock to that which would be sufficient to pass the largest boats, which are likely to be employed upon the river.

* Sinteral.
Enchampilly.
Dawalmarri.

† Recorded in Proceedings of Government, 8th November 1861, No. 2,069.

8. Before, however, the Government can fully decide upon the character of the works to be constructed at the Barrier, it will be necessary that they should be in a position to determine which of the two systems, alluded to in paragraph 3 of these Proceedings, it would be desirable to adopt; and in order to this, it will be necessary that Captain Haig should submit a plan and longitudinal section of the river, and should point out the spots at which, in case of the adoption of the second plan, it would be necessary to erect Anicuts. He will also point out any collateral advantages which would result from the construction of these Anicuts, such as the facilities thereby offered for irrigation, &c.; and on the other hand, he will submit an approximate Estimate of the probable cost. In making these Estimates, he will take into consideration the probable necessity of increasing the size of the Locks, and the width of the Canal at the Barriers; for it will of course be impossible to keep a steamer between each pair of Anicuts. On the other hand, as the velocity of the stream will be very much reduced, smaller steamers will have power enough to tow the boats; and the size of the Locks provided in the Estimate should be adapted to such a class of vessels.

9. Captain Haig will carefully consider the relative advantages and disadvantages attendant upon each of the two above mentioned modes of improving the navigation, without any reference to the expense, which will be a separate question, and as such will be a matter of consideration for the Government. He will look into the question as one purely professional, and having reference to the facilities which each scheme will afford to the navigation. The Government will then be in a position to decide which of the two it will be desirable to adopt.

10. The question of the Cocanada Harbour must be dealt with separately; but it ought to be brought forward without delay.

(Signed) W. H. HORSLEY, Lieut.-Colonel,
Chief Engr. and Secy. to Govt., D. P. W.

Navigation of Upper Godavery

Memorandum —

The Govt is desirous to perfect as far as possible the navigation of the River from Dowlaishwaram upwards to the Cotton districts of Berar &c. and when I say to perfect the navigation, I mean that there should be the means of passing Boats up and down during the whole year, including dry season — of course during the season of floods the up traffic will be delayed, but arrangements should be made for special facilities for the down traffic, it is expedient that means should be provided to pass the Boats which have come down with the freshes, up again with as little delay as possible —

There are two modes in which the improvement of the River may be effected. The first is that proposed by Capt Haig which may be described in general terms to combine a system of Anicuts & Locks at the three great falls or Rapids in the River, with a general improvement of the channel in the plains where it is now impeded by Rocks & Sand Banks, and should it be wished to maintain the Navigation

during the dry season) with
a system of Reservoirs, from
which a quantity of water
could be poured into the
River sufficient to create
an occasional or perma-
=nent flush, of a depth suffi-
=cient to float the craft
navigating the River -
The second scheme would
be that commonly adopted
on Rivers, namely to
reduce the rapidity of the
stream by the erection of
Dams or Anicuts at
different points, at which
points Locks would be
required to raise the
Boats from the level from
reach to that of another -
This second scheme would
of course be more expensive,
but at the same time there
would be more effective
and would offer far greater
facilities for the up & down
which it would not offer
any impediment to the
down navigation -
The whole question however
is complicated with that
of the Irrigation of the Delta
of the Godavery, and of other
tracts of country which
might be brought within
reach of the water, this
also mixed up to a certain
extent with the question
of the improvement of the
harbour at Coconada, which

is becoming every year shallower
& consequently less fitted for
the purposes for which it was
originally intended. —
It appears from Capt Hayes
report that during the dry
season the River does not
bring down sufficient water
to supply the wants of the Delta
& therefore the existing
supply is made to pass through
the head sluices at Dowlaisheram
into the Irrigation channels
& there would be a deficiency
which any amount of
water taken from the River for
Irrigation higher up the River
would be a still greater defi-
=ciency at the Delta - it is
therefore evident that a
certain amount of water
must be stored. The only
question will be as to the
amount. This of course
will depend upon the
demand for water below,
and in calculating this
reference must be made
not merely to the actual
amount of land which
may be brought within the
range of the existing channels
but also to the large amount
which might be brought
within reach of water were
an Anicut constructed.
as suggested by Sir Arthur
Cotton, at the point where
the River leaves the mountains
at about 25 miles or upwards

above Dowlaisheram -
in fact the first thing to be
done is to secure a sufficient
supply of water -
This forms a part of Capt^n
Hays scheme, and it
may possibly be the case
that the amount of water
considered by him to be
sufficient to afford
all reasonable facilities
for the navigation of
the River might also prove
sufficient to irrigate the
country which might be
brought within the read
of the different channels.
by combining them a
system of Irrigation, with
that of the Navigation of the
upper Godavery, a larger
return might be secured
for the money expended
than could be looked for
were the whole cost of
the scheme charged to the
Navigation - for instance
the Anicut at the outlet
of the mountains and all
the channels at that
high level might be
charged to Irrigation &
a large portion also of the
cost of clearing water
leaving the work to be done
for Navigation only, limited
in amount to that which

would be required to sur-
=mount the difficulties
in the channel of the River
itself, and such extra
supplies of water as might
be required to give depth
of water generally in the
main channel - —
With reference however simply
to the Navigation there can
be no question as to the ne-
=cessity of the works at the
three Barriers or Rapids
and the only mode of sur-
=mounting them would
be by a canal round each, a
canal coming up from the pool
below the rapid to the still
water above. —
The only question which
requires to be decided before
the work can be pushed
forward actively is the
size of the Boats for
which the locks are to be
constructed -
Capt^n Hay's detailed
Plans, submitted some
months ago, provision
was made for locks 200 feet
long and 45 feet wide.
I objected then to the size of the
locks as involving an unne-
=cessary amount of expense
to say nothing of the risk -
The Secretary Capt^n Hay in having
such locks would allow the
Steamers to pass through them.
It has however been suggested

Lunenburg Co. Hawley that if
Steamers were to ply between
the Barrier above shelving
them, the expense of Locks might
be reduced to that which would
suffice to pass the Cargo boats,
while the Steamers might
if necessary be passed up during
the Summer floods, the
permanent ways employed at
different parts of the river -
This would meet the Steam
Plan; the expense constructing
the Canal & Locks would be
very much lessened, and a
diminution of the width of
the Locks, involves a large re-
duction in the width of the
Canal - in the quantity of
masonry, in the scantling
of timber &c. while though
there may at first, perhaps be
a little extra expense in the
employment of Steamers
yet this if any, would soon
be more than met by the saving of
the navigation - I am
disposed therefore to think
that Capt. Hall should
be called upon to revise
the Estimates for the work
at the lower Barrier
by diminishing the width
of the Canal & the size of
the Locks to that which will
be sufficient to pass the
largest Boats which are
likely to be employed upon
the River.

hope however the Govt. can
finally decide upon the channels
of the works to be constructed
at the Barriers, & will be re-
-quisite that it should be in
a position to determine which
of the two systems alluded to
in my Early part of this
memorandum should be
ultimately adopted - and
accordingly this I will be
necessary that Capt. Hall
should submit a plan
and separate Estimate
of the River, and should
point out the spots at
which, in case of the adoption
of this second Plan, it would
be necessary to construct
he will also point out any
collateral advantages which
would result from the
construction of these Artificial
Locks the facilities thereby
offered for Irrigation &c -
and on the other hand he
will submit an approx-
-imate Estimate of the pro-
-bable cost -
in making this Estimate
he will take into consid-
-eration the probable re-
-turns the probable ne-
-cessity of increasing the
size of the Locks & the width
of the Canal at the Barriers
for it will of course be
impossible to keep a steamer
between each pair of Artificial

on the other hand, as the velocity of the stream will be very much reduced smaller steamers will have power enough to tow the Boats, and the use of Pinnaces in the Estimate shows it adapted to that object purpose. —

Capt. Hay will consider carefully the relative advantages and disadvantages attendant upon each of the modes of improving the navigation ~~obtainable~~ without any reference to the expense which will be a separate question, these considered by Govt. he will look at the question as one purely professional, and having reference to the most feasible scheme with a view to the navigation with a full view will then be in a position to decide what would be desirable to adopt.

The Coconada question must be dealt with separately, but it must be brought forward without delay.

No. 163.

Copy in a Letter to E. dated 4th April 1862 No. 223
C22 Jany R-2 & 1

Public Works 1862 Depts
Proc: of Govt for January

No. 222

Minute by the Honorable the President

Dated 2nd Jany/62.

On Improving Navigation of Upper Godavery.

Public Works Department

No. 83 13

Proceedings of the Madras Government

Under date the 30th January 1862

Read the following Minute by the Honorable the President.

Regarding the improvement of the navigation of Upper Godavery

Secy Enter 21st January 1862

1. Captain Hay having arrived at Madras pursuant to orders, the Government resolve to call upon him to communicate his views on the subject of the Navigation of the Godavery river, with reference to the following observations.

2. The Government are desirous to perfect as far as possible the navigation of the Godavery River, from Dowlaish-weram upwards to the Cotton Districts of Berar; i.e. they are anxious that there

should

should be the means of passing Boats up and down during the whole year, including the dry season.

During the season of Floods, there would of course be special facilities for the down traffic; but as the up traffic would be naturally delayed at that time, it is expedient that means should be provided to pass the Boats, which have come down with the freshes, up again with as little delay as possible.

3. There are two modes in which the required improvement of the River may be effected.

I. The first is that proposed by Captain Raig, which may be described in general terms to combine a system of Anicuts and Locks at the three great Falls or Rapids in the River, with a general improvement of the Channel in those places where it is now impeded by Rocks and Sand Banks, and (should it be wished to maintain the Navigation during the dry season) with a system of Reservoirs, from which a quantity of water could be poured into the River, sufficient to create an occasional or a permanent fresh, of a depth sufficient to float the Craft navigating the River.

II. The second mode would be that commonly adopted in Rivers

Rivers, viz to reduce the rapidity of the Stream by the erection of Dams or Anicuts at different points, at which points Locks would be required to raise the Boats from the level of one reach to that of another.

4. Of these two Schemes, the second would of course be more expensive, but at the same time it would be more effective than the first, and would offer far greater facilities for the up traffic; while it would not offer any impediment to the down navigation -

navigation - The whole question, however, is complicated with that of the Irrigation of the Delta of the Godavery, and of other tracts of Country too, which might be brought within reach of the water - It is also mixed up to a certain extent with the question of the improvement of the harbour at Coconada, which is becoming shallower every year, in consequence of being the receptacle of all the mud brought down by the Godavery -

5. It appears from Captain Haig's report, that during the dry season the

the River does not bring down sufficient water to supply the wants of the Delta - If then the whole of the existing supply is made to pass through the head Sluices at Dowlaish-weram into the Irigating Channels issuing thence, there will be a deficiency of water; while if any amount is taken from the River for Irigation higher up, there will be a still greater deficiency at the Delta. It is therefore evident that a certain amount of water must be stored - The only question will be as to the amount of this storage: this of course will

will depend upon the demand for water below; and in calculating this, reference must be made not merely to the actual amount of Canal which may be brought within the range of the existing Channels, but also to the large amount which may be brought within reach of water, were an Anicut constructed at the point, as suggested by Sir Arthur Cotton, where the River leaves the mountains, at about 25 miles or upwards above Dowlaishweram - In fact, the first thing to be done is to secure a sufficient supply of water -

Irrigation Commission

This forms a part of Capt: tain Haig's scheme; and it may possibly be the case that the amount of water considered by him to be sufficient to afford all reasonable facilities for the navi: gation of the River, might also prove sufficient to irrigate the Country which might be brought within the reach of the different Channels -

6. By combining then a system of Irri: gation with that of the Navigation of the Upper Godavery, a larger return might be secured for the money

money expended, than would be looked for were the whole cost of the scheme charged to the navigation alone; for instance, the Anicut at the outlet of the mountains, and all the Channels at that high level, as also a large portion of the cost of the storage of water, might be charged to Irrigation, leaving the work to be done for Navigation only, limited in amount to that which would be required to sur: mount the difficulties in the Channel of the River itself, and such extra supplies of water as might be wanted to

give

give depth of water generally
in the main Channel.

7. With preference
however to the Navigation
simply, there can be no
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of the works at the three
Barriers or Rapids; and
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mounting these would
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by Captain Faig, viz
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cided before the work
can be pushed forward
actively, is the size of the
Boats for which the Locks
are to be constructed. In

* Sinteral
Luchampilly
Duvalmarri.

* recorded in Pro: of Govt. 8 Nov/61,
No. 2069.

In Captain Faig's de-
tailed Plan submitted with
the Chief Engineer's letter
of the 1st May 1861, No. 41, pro-
vision was made for
Locks 200 feet long and
45 feet wide. In his
Minute of the 19th August
1861,* the Honorable the
President objected to the
size of the Locks as
involving an unnecessary
amount of expense to no
nothing of the risk. Cap-
tain Faig's object in pro-
posing such Locks
was to allow the Steamers
to pass through them.
It has since, however,
been suggested by
Colonel Forsley that,
if Steamers are to ply
between

between the Barriers and above and below them, the size of the Socks might be reduced to that which would suffice to pass the Cargo Boats, while the Steamers might, if necessary, be passed up during the Monsoon floods, and be per= =manently employed at different parts of the River - This would seem to the Government to be the best Plan: the expense of construct= =ing the Canal and Socks would be very much lessened, as a diminution of the width of the lock would naturally cause a corresponding reduction

in the width of the Canal, 25
in the quantity of masonry, in the amount of Timber Vcs; while there may at first perhaps be a little extra expense in the employment of Steamers, such extra expense, if any, will soon be met by returns from the extension of the navigation - The Govern= =ment would wish Capt Haig there= =fore to revise his Estimates for the work at the lower Barrier, by diminishing the section of the Canal and the size of the Sock to that which would be sufficient to pass the

largest

largest Boats which are likely to be employed upon the River -

8. Before, however, the Government can fully decide upon the character of the works to be constructed at the Barrier, it will be necessary that they should be in a position to determine which of the two systems, alluded to in para 3 of these Proceedings, it would be desirable to adopt; and in order to this, it will be necessary that Captain Hardy should submit a Plan

Plan and longitudinal Section of the River, and should point out the spots at which, in case of the adoption of the second Plan, it would be necessary to erect Anicuts - He will also point out any collateral advantages which would result from the construction of these Anicuts, such as the facilities thereby offered for Irrigation V^co^ 7 and on the other hand, he will submit an approximate Estimate of the probable cost - In making

These

these Estimates, he will take into consideration the probable necessity of increasing the size of the Locks, and the width of the Canal at the Barriers; for it will of course be impossible to keep a Steamer between each pair of Amouts - On the other hand, as the velocity of the Stream will be very much reduced, smaller Steamers will have power enough to tow the Boats; and the size of the Locks provided in the Estimates should be adapted to such a class of Vessels.

9. Captain Fraser will carefully consider the relative advantages and disadvantages attendant upon each of the two above mentioned modes of improving the navigation, without any preference to the response, which will be a separate question, and as such will be a matter of consideration for the Government - He will look into the question as one purely professional, and having reference to the facilities which each scheme will afford to the navigation. The Government will then be in a position to decide which of the two it will be desirable

desirable to adopt-

10- The question of the Cocanada Harbour must be dealt with separately; but it ought to be brought forward without delay.

W. W. P.

To Copies

To The Chief Engineer
" District Engineer Upper Godavery Disp^d 30
13. " — " Deputy Chief Engineer S.C.

Copy in a Letter to E.
dated 11th April 1862 No. 23.

Navigation of Upper Godavery.

Public Works 1862 Department
Proc: of Govt. for January

No. 83.
Proc: of the Madras Govt.
Dated 30th January 1862.

Minute by the Honorable the President regarding the navigation of Upper Godavery with order thereon.

No. 1634164.

Rec'd Jany R. 25th