...ent's Office.] NO 1896.

COPY OF SERVICE MESSAGE BY ELECTRIC TELEGRAPH.

Datacammnd. To Madras.

4th Ric Betts To Col. Bridwood

WORDS 1900

Did not see my name
Gazette of 22nd. Am I to
one at Tuticorin poly. Please
grapite Reply.

30" 14—25

among several Misplaced
writing may be suspect
the Dff or the telegraphic
clerk

Commenced. Finished.

at From

at to

om Station forwd to

Telegraph Office,
June 1863

J. C. Sperling
Mspt in Charge.

No 11

Ordered that the following reply be sent

To Wm Rae Bletts
Calcutta

Among several others you have sent some copy to say been removed from the Dispatch on the reduction ordered from Calcutta

8th July/43
Chepauk

Stating that he did not see his name in the Gazette and requesting to be informed whether he is to rejoin at Trichinopoly

No 11
W Thomson

Names of Canals	Slope	Width	Depth of Cutting	Slope of Sides	Strength what Soil Chiefly	Remarks.
Cocanada		147'–396'	16'6"–4'	1 to 1	Clay Soil, Gravel and alluvial	
Canal to Main	Main	80'–37'	3'–2'	1½–4 – 3½–4	Clay Soil, Gravel, alluvial and Red Soil Sand	The Cutting of the Canals is so long irregular
Canal to Main	Branch	93'–81'	13'–3'	2½–3 – 1½–2		that Sections Taken on
Cokingee		46'	4'	1½–2	alluvial Clay & Sand	the same line of Canal
Yanam		90'–20'	6'6"–3'	1½–4 – 1½–6	alluvial Clay & Sand	in different places
Yarna Lanka		49'–30'	8'–4'	1½–1½ – 1½–1	alluvial and Black Clay	are very dissimilar
Amalapore		41–33'	6'–4'	3½–5'– 3½–2	alluvial & Black Clay	
Immadum		64'–32'	7'–4'6"	1½–1	alluvial & Black Clay	
Akeed		128'–42'	5'–6"	1 to 2	Gravel alluvial and B Cock. Clay	
Nursapore		50'–48'	4'6"	2½–3 – 1½–1	Ditto.	
Siddantum		40'–33'	4'6"	1½–1 – 1½–2½	Ditto.	
Ellore.		90'–35'	7'6"–4'	Most part cut in steps.	Ditto.	

W Thomson Lt R.E. Supt

Division of the Delta.	Name of the Canal	Sectional Area in 1858	Average supply of water per hour from 1st July to the 1st of October 1858	Supply of water per hour the Channels are capable of supplying	Remarks.
					— " —
Eastern Delta	Samulcotah High Level	25	20. 130	45.000	
	Cocanada	72	98. 278	118.000	
	Coringa	"	70. 000	98.000	
	Janam	"	30. 000	42 000	
	Total		218. 408	303.000	
Central Delta	Tarna Lunka	30	22. 000	46.000	
	Amalapoor & Pallee	44	54. 500	64.000	
	Immarum.	14¼	48. 548	54.000	
	Total		125. 048	163.000	
Western Delta	Ellore High Level Canal	"	60. 000	70. 000	
	Aeed	82	123. 400	200. 000	
	Nursapoor.	108	143. 800	200. 000	
	Siddantum	30	34. 500	50.000	
	Total.	"	361. 700	520. 000	
		"			
	Grand Total	"	705. 156	986.000	

P. L. Bruce
Lt-Col. R. E.

Statement of Remunerative Works in the Godavery District for the Year 1861 – 1862.

Name of Work.	Capital. Outlay on Construction				Revenue. Charges			Income		
	Description	Amount up to the End of the Past Year	Amount in the Current Year	Total	Description	Amount up to the End of the Past Year	Amount in the Current Year	Total	Description	Amount up to the End of the Past Year	Amount in the Current Year	Total
Godavery Anicut and Mo Irrigation Works.	Outlay on the Original Work and Renewals	3.428.390	65.269	3.493.659	Interest on the Capital 3.428.390 at 4 per Cent	1.069.397	137.136	1.206533	Gross Receipts from all Sources	10.457.457	1.797.912	12.255.369
	Deduct Diminution 3 Years and Year at 1 per Cent	221.018	34.284	255.302	Maintenance and Repairs	1.992.786	277.335	2.270.121				
	Balance of Capital	3207.372	30.985	3.238357	Total Balance of Charges	3 062.183	414.471	3.476.654	Total Balance Income	10.457.457	1.797.912	12.255.369
										7.395.274	1.383441	8.778.715

Total Collections as per Statement of Income Tax. — Collector. 23rd of March 1862 deducting — Rupees 3. 820. 912

Average Revenue and Collections of the Anicut for 5 Years before the Construction — 2. 023. 000

Balance of Capital = 3.238. 357
Balance of Income for Current Year = 1. 383. 441
Per Centage Return = 42 2/3.

Increase 1. 797. 912.

91/0922 Mfc

Statement Shewing Expenditure incurred On some of the Inlets in the Godavery District up to the End of the Year 1861 – 62.

Names of Deltas	Names of the Channels &c –		Amount of the Expenditure	Total of Each Channel
			Rupees.	Rupees.
Eastern Delta.	Samul & Nath Canal	Main Channel	64.705-	
		Branches	4.219	
		Masonry	12.725-	81.649
	Co Canada Canal	Main Channel	55.717	
		Branches	57.824	
		Masonry	43.493	157.034
	Samul & Nath and Co Canada formation	Main Channel	35-320	
		Masonry	118.256	153. 576
Central Delta	Pallee Channel	Main head	157.976	
		Masonry	5-224	173.200
	Innavaram Channel	Main Channel	5-4 9/11	
		Branches	19.459	
		Masonry	262.112	336.482
	Amalapuram Canal	Main Channel	78.974	
		Branches	42.685-	
		Masonry	45-647	167.306
			304.146	
Western Delta	Ellore Canals	Main Channel	1.479	
		Catch Drains	97.382	303.047
		Masonry		

Lieut – Madras [illegible]

Report
on
The Irrigation Works &c--
in the
Godavery District

The Godavery River.

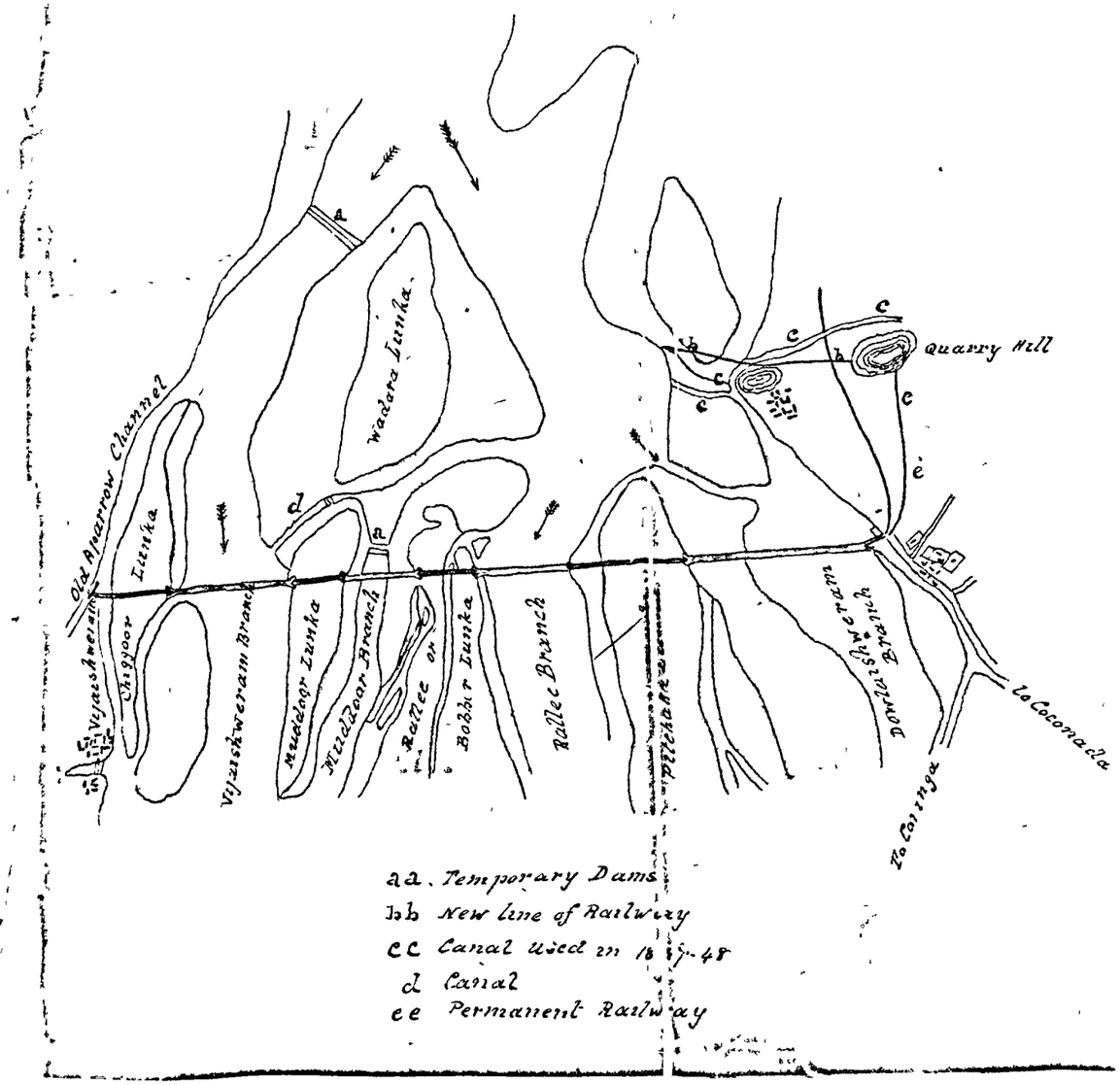
The River Godavery has its
sources among the
hills in the western Coast
of India and in its
Course down to the sea-
drains an Enormous
Tract of Country
The length of its course
from its Entrance
at between 650 and
700 Miles. The Godavery
is liberally supplied
with water from North-East-
and South-West-Monsoon
rains. Emerging from the
Hill Tract in Village
Called Polaram, about
28 or 30 Miles above the
Head of the ---- Delta
the ---- Catchment
area increases at the rate of
---- Square Miles for
each Square Mile of the

Central, and Western
Dellas Them Dellas
Collectively Contain an
area of abt 2000 Square
Miles of the most magnificent
Alluvial Soil. In the
Irrigation of which the
Godavery is most Eminently
Situated as it actually
flows along the top of
a ridge, from a most
distance below the point
at which it debouches
from amongst the hills.
The ground sloping
on either side in a
Perpendicular direction
to the Course.

The General System of the
Godavery Works is as follows
An Anicut or dam at
Dowlaishweram to store
up water and retain it
at the required height for
distribution over the surface
of the Country
Drainage Channels for the
escape of Surplus water
River Embankments &c
Minor drainage from
Rivulets
Irrigation Channels

General System of Works

Sketch
of the Head of the Godavery Delta, shewing the arrangement
of Railways and Canals for carrying on the work in
1848 - 49



& head Dist water shed
the surface of the Country
Navigable Channels for
the transport of goods,
Produce and passengers.

Position of Annicut

The Annicut is situated at
Omalaisheram, about 4½
miles below Rajahmundry
by Canals, and at is distance
by the River (which varies
& the Amount of water)
from 4 & 7 miles.
Between Omalaisheram
and Tyashweram the
River is divided into
four Channels & Cut Roads
or islands — See outline
attached — And across
Each of these Channels
there is a separate dam
or Annicut. The names
of these Branches are
the Omalaisheram, the
Ralla, the Amdoor,
and the Tyashweram
these Cut Roads are of
great advantage in
the Construction of the
Annicut as they form
Points from whence to
Commence the Work, and
also by dividing the

the Stream, admitted of the Water being diverted from Each Branch in succession during the time of its Construction

Commencement of Ament
Historical Sketch

The Ament-Operations were Commenced in 1847. Between Jany and Feby 1847 the Preparations for the Actual Building were Completed. Bonds of Cong. Stone. Jras and Bamboos, and Brushwood were built-up above the Actual Site of the Aments Stretching from Cuttack to Cuttack, by this means a Strg Space was cleared for the Building Operations and also, the Water being Retained, there was a sufficient depth for Transport of Materials. Quarrys, Ramanagar, Lime Kilns &c -- &c -- were Commenced, Embankments across Mouths of the Cuttacks were thrown up, Railway Sidings &c -- were laid out and used

Number of Boats of about 25 tons Burden Each, were Launched. Much Trouble was often Experienced in keeping the Cuttacks open and at times the Supervision was Careless and inefficient

1848. In 1848 the Dowlaishwaram and Muddoor Branches of 1400 and 520 yards in Length respectively were built-up a height of 9' above the deepest bed of the River. The Dowlaishwaram Lock. Head Sluices, and Under Sluices were nearly Completed and the Palla Branch built-up to a height of 5 feet. On the Palla Branch the Wing walls and the Under Sluices, the Lock and the Head Sluices were Commenced, On the Vyasheswaram Branch the Head and Under Sluices and the Locks were also begun

During Some unfortunate failures in the Tramway waggon wheels, the Iron tires of the Annicut were considerably damaged, the water also being very low, the transport of Stone was a slow and tedious affair. Two Channels were Cut in the Land on the Dowlaiswaram Side for the transport of Stone, but as they were deepened through the Sand were unable to keep up the Depth of Water necessary for Boats to Come down, and having been about the 20th Carried away about 88 Yards of the Embankment in front of the Sluices and the Railway Embankment on the Dowlaiswaram Side was Carried away a Yard of Sand and Gravel again delayed the Work Considerably.

1849

In May 1849 the front Retaining wall on the Vyasharaim Branch was Carried away to the Extent of 44 Yards, and a Quantity of Loose Rough Stone was also swept down through the Breach

In September 1849. a Jubilee Signal Light accompanied by a heavy Gale of Wind Caused Several Breaches in the Stone Embankments the Stone Sluices and General Stone Boat Canal at Stone Bridges and the Dowlaiswaram Branch Slightly Breached In this Year the Masonry Works were nearly all Completed with the Exception of the Head Sluices and Locks at Ballen Flats were at one time Contemplated that the Ballen Branch should be Completed, as it was then the only Outlet for the Escape of the water.

In 1850 the Annicut was

April

an average height of 10½
feet along the entire length
of the Tyashiniam Branches
suffered some damage
from freshets; seven piers
in the Valley under
sluices fell and 2 partially
sunk. Col Comstock
remedied this in 1877
by increasing the width
of the front and rear
apron and placing
a double row of cribs
under the front retaining
wall. The fall of these
piers was attributed to
the insufficiency of the
masonry aprons.

Defeats. Experiments

The Channel on the Tyash-
-iniam side being the
fast deeper than the
Nisqually, the ancient
bed of Commencement Bay
the fast higher. This made
the overfalls long heavy
Compounded them and
a tendency to disturb
the apron and cause
wash at the end of the sluices

below. The position
of the Dalles Dam
Lock is not particularly
good as it lies in
the direct line of the
current of the River
which makes entering it
a matter of some difficulty
and danger when the
River is high, also the
Lock is divided from
the River by a single
and not particularly
strong wall, and as
the water outside is
sometimes very much
higher than it is
inside, there is some
danger of a collapse
in the whole affair
The Dalles Dam
dead and under
sluices are sometimes
prevented from closing
during the freshets
by accumulations of drift
wood &c---- against the
piers, to remedy this
Col Craig designed
a long ingenious and
simple contrivance of
slips of iron set together
in such the same
principle as that on

which portable Jackhammers or Steam Drills are constructed. These Workers have not had such a fair Trial.

In the Keller Ranch the deep Rough Stone foundations allowed the water to flow through in considerable quantities. But they were afterwards made tight by a puddling of Clay on the outside. The Aqueduct being built of Rubble Stone, there is a good deal of wear and tear during the freshets; small quantities of large portions have to be renewed from time to time

In December 1857 a breach of 200 yards was formed in the Middle Branch Dam. The current had formed a deep hole in front of the work, the bottom of the bank of which was undermined. The Land from under the foundations fell and the formed hole

frequently the rubble pretty bruised —

To repair this breach a dike was thrown about eight or nine hundred yards above the aqueduct. When the river was low four deep, large baskets or gabions filled with stones were laid from the sides of the River across the current. There two lines of basket-work were laid but to be made to join and bolted in the middle, they were invariably washed away and the place deepened. Another land and disheartening labour and this scheme was finally abandoned. The river however naturally fell. A place only seven feet deep, a little higher up stream was chosen. Seven boats in line, simultaneously laid down baskets as before. In a week a dam was formed and the breach was repaired

The amount is now being raised two feet along the entire length. This increased head of water is required in the district for both navigation and irrigation. The water was formerly retained two feet higher than the crest of the Amicut by means of ollips or planks set in between the iron posts, which were placed ten feet apart along the front wall throughout the entire length of the Amicut. These planks were taken out during the freshets and again replaced when the water had subsided. Now and then these smaller freshets never came, and occasionally they followed up the subsidence of the cargo ones. The bricks & admixture being replaced consequently this temporary method of raising the

Necessity for Raising Amicut

The amicut could not be dispensed on.

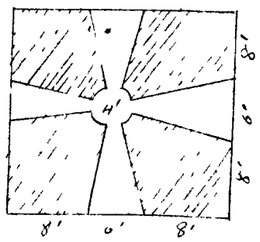
Cost. The original Estimate was four Lacs of Rupees
The actual outlay about 980.000 Rupees
The average yearly Cost of Maintenance about 50.000 Rupees
The average prices for Repairs are as follows.

Replacing Cut-Stone facing 9 Rs. per Cubic Yd.
Plastering where required 2½ Rs per Square
Strengthening the apron 1 Rs. per Ton
Replacing sluice and Calingular Shutters 2½ Rs per Cubic foot
Temporary Bunds at 1 Rs per running Yd.

Materials. The bricks used were of the usual dimensions but Rather an inferior Make. They were used in building the Arches &c: -

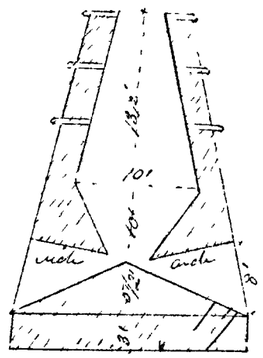
of Each mill was about
Rs. 6.

Stone was found in or
Hill close to the Lappa
Camp, about 2000.
Yards from the aniicut
It was a soft coarse
Sandstone which
found in Small Bits
In Ormara which
Was of a first-rate
Hydraulic quality
The stone was conveyed
on Tramways with a
Good slope the loaded
wagons coming down
& their own weight
And the empties ones
being drawn up again
& Mules or ponies in
The day time and
& Coolies at night
& Locomotives were Shunt
Seen used on the
Tramways but they did
not arrive from Calcutta
in time the use of these
Three Tramways cost
about 6000 or 7000 Rs
Per Mile. The line
Will want in square



Plan.

Samulcotta Canal.



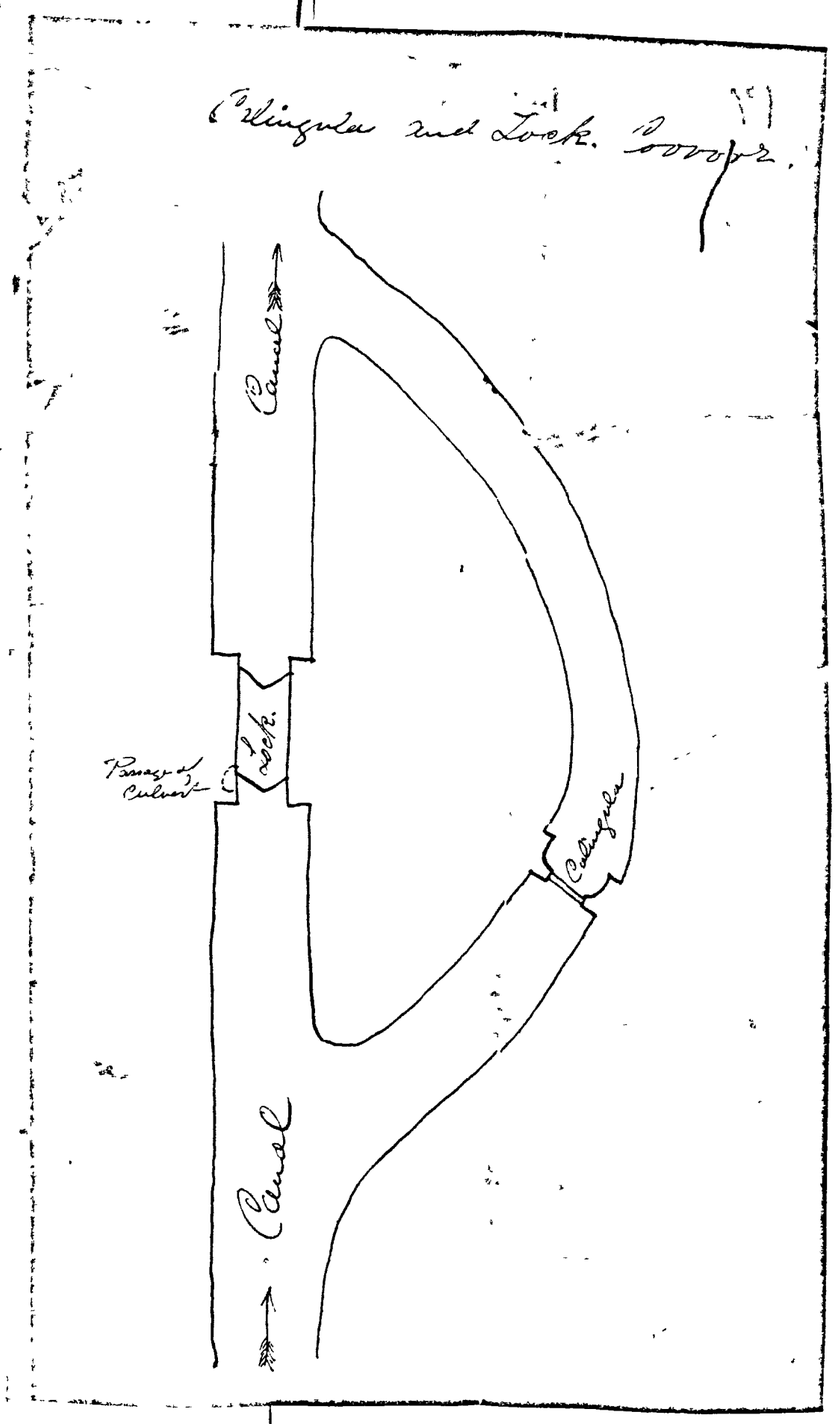
Section

Land Tiles built of Brick
in Ormara. Hollow and
inside and Brick in
Mud outside about
350 or 400 packs of
Ormara Tiles burned
out of 3 Each of these tiles
in four days. These cost
Rs about 500 Rs Each
One was on Bottle Cuttack
One at Rajahmundry
Two at Dowlaiswaram
and one at Vijayawada
The plan and Section of
These Tiles are shown
in the Drawing.

The Samulcotta Canal
which branches off from
the Coconada Canal at
Cuddeem, a Village about
Four Miles from the
Dowlaiswaram Anicut
is almost Exclusively
a Navigation Channel
it receives most of the
drainage of the Country
About it, Runs on Level
a dead Level and
Irrigates but a Small
Portion of the Land
Between Samulcotta and
Coconada there is
Branch in some Places

When the Canal crosses the drainage Channels, the drainage water is disposed of in either of two ways as the Case may be First by passing through a Culvert under the bed of the Canal, or, when the drainage and Canal Channels are nearly on the same level it is allowed to pass through a side opening directly into the Canal and flow out again over a Caling ula on the opposite side. All the locks are provided with Caling ulas, to get rid of any superfluous water in the Canals and to prevent the accumulation of silt in front of the locks. Each Caling ula is fitted with shutters similar to those on the crest of the amount by means of which the flow of water is regulated. There is also a duplicate called a Sambuja

Caling ula and Lock. 1902.



in Each Calicinglas
I means of which the
water can be let out
of the Canal to that
Level of the channel bed.
The Sketch in the
margin shows the
manner in which the
Locks and Calicinglas
are generally situated
placed.

There are three Locks
between Donbars Marsh
and Cocamadan, Each
100 feet long. 15 feet
wide, and 9 feet lift
One of these Locks are
in a good state of
Repair and they are
all two Boat and
five narrow.
The Contract between
the above three Locks
and the three between
Jamules Path and
Cocamadan is thus
marked in Journ of
the Letter. The double
Lock at Jamules Path is
in a very perfect State
And is in fact as
long since Mr. Ogle
has formerly Direct and

Inst- The pressure of water
alone was considered
inadequate and it was
accordingly lengthened
and the Chamber 8 ft-
a 9 foot lift was
added and this was
15-0 feet long and 20
feet wide. The supply
Chamber filling by means
of a Culvert- and well
in addition to the usual
Sluice Gates. Before
reaching this Lock the
Canal crosses the River
Elkhorn by means of an
Aqueduct- which although
not a peculiarly picturesque
is a particularly good
Work. It consists of
5 arches of 15 feet- span
Curve. are of a circle, rise
3 feet. Foundations 6
feet- deep. Spandrels of
Rammed dressed Stone
filled in with Rubble
Piers Which Concrete 2½
feet- thick to prevent
leakage. The next
Lock between Coranda
and Jamalestake is
Single. 150 feet-
long and 20 feet- wide

Inst- Both Locks and in
good repair
In the Contract details
in No. Immarum Channel
as the Locks have small
lifts of about 4 feet- at
the most- The Chambers
sides are simply Rubble
Stone, dry laid at a
good batter The gates
are of Canvas Pattern
inst- The Drawing in
the usual way

Immarum Aqueduct-

The Immarum aqueduct
leads a Branch of the
Immarum Canal across
the Minor Branch of the
Western or Yamatheam
Irrigation. In the
Irrigation of the Tracts
of Country below, Consisting
of about 362,000 acres
The Length of the aqueduct
between the abutments is
2.248 feet-, 49 arches
Each 40 feet- both way
at Springing of Curve. The
Piers are 48 in Number
and have a batter of 6" down from
the Springing The abutments
or Wing walls are
Segments of Circles
of 35 feet- R

Ending in Return walls
15 feet long, thro Locking
the Work into the Bank
forming on either Side of
the River. The entire
Work rests on walls 5½
feet diameter and 8 feet
deep in Sand
Height of piers from Flow
Spring of arches 11½ feet
Rise of arches 7 feet.
Thickness through Work
2½ feet. Height of parapet
above line of Crest of arch
Crown 6 feet. On the
Mississ Stream Side is an
Inning or foot-path. There
is a fall of 2 feet between
the Abutments, and as
there is no flooring to
the water way, in many
places the water flows
over it so as to wash away
During the freshets the
water in the Rock
River above the Crown
of the arches, and foot
and rear Arches of large
and well packed Stone
are provided, which also
protect strengthened with
Parallel lines of Pickwork
The whole Work is built of

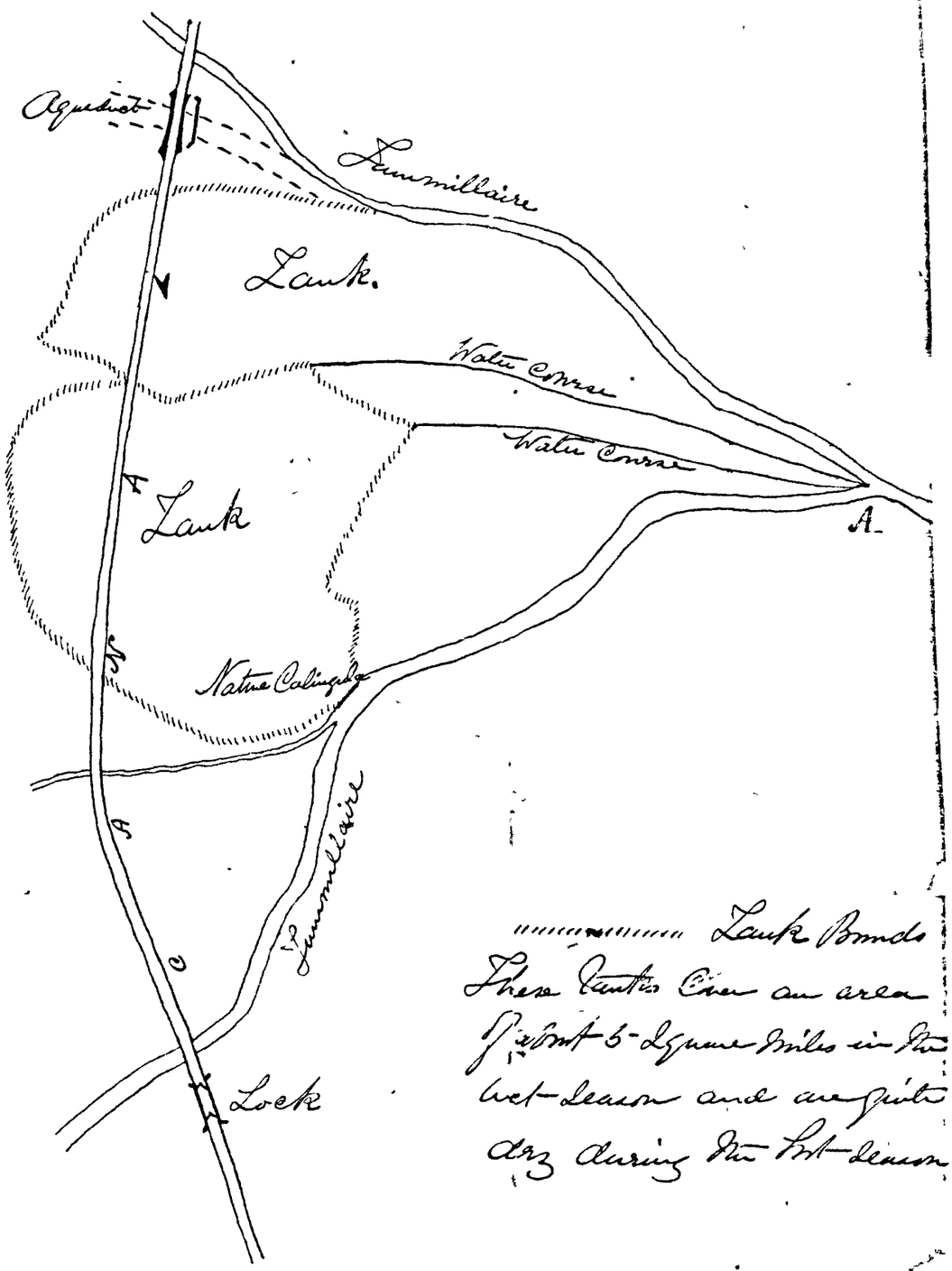
on some occasions above
mid Height, the Cornice being
Oblique & handle there
Work. Loads of stone of
thing size of large dimensions
18"×6"×3", and Stones
their own proper
Weight a Table of ½ inch
diameter traversed each
Brick through the entire
length. Stone called
for have been procured
for this Work, Some from
Mount Damlais Mountain
about 30 Miles distant
The aqueduct has been
breached three times,
first Each time it was
successfully repaired
Abutment piers are built
so that in case an arch
is damaged in any way
and falls, the damage
will be limited to those
between two of the Abutment
piers. The Extraordinary
Freshet of 1861 flooded
at a height of 4 feet
above the Structure which
received no damage. The
Aqueduct was Estimated
at £3000 but in
consequence of the Work
being so hurried

Ford Mr R was Employed by
the Canal Company in the Months
and the Whole Affair
Completed in Three Months
During the Construction a
Jacket Came and flowed
over the Building but no
Damage of a Serious Nature
was Caused by it.

The Ellon Aqueduct

On the High Level Canal
in the Eastern District
about 700 or 800 Yards
from the Town of Ellon
there is a fine Cut
stone Lock, with a 9
feet lift. The Junction
of the Canal and Aque-
duct will be seen
in the accompanying
diagram. The Lummelair
River over which the
Aqueduct is Constructed
divides at A. Embracing
the Town between the Two
Branches. The water
will Eventually be diverted
from the Eastern Branch
into the Western when
it will be Made to
Enter the Canal marked
B. The Western Branch

V.33



These Lands Cover an area
of about 6 Square Miles in the
Present Season and are quite
dry during the Present Season

Caligula and under
the Aqueduct.
The Foundations in the
Aqueduct are most part
deep under the Piers,
Abutments and Piers
Arches, and most part
beneath the water are
Piers of Rough Stone
in Chunam and the
Round Excavated for
them was alluvial Soil
and Sand alternately.
There are 12 Arches in
the passage of water
the Span 15 feet and
Rise 3 feet. Piers are
1½ feet. Which throughout
the Piers are 5 feet
High from the Ground
and the Spring of
the Arches, and 5 ft
feet. Which Piers
from the Pier is each
Abutment Pier, & that
in Case of one Arch
Giving way, the rest
Piers would fall
of Necessity. The Entry
to the Drift in the
Down Stream side is
is Supported by 6 Arches
two of which Spans 5
2 of them Supporting
Arches

Arches are 2 feet thick
with a rise of 7 feet and
a Span of 34 feet.
The depth of water being
7 feet. width of ditto 32
feet 6 inches and
a layer of Concrete 6
inches thick. over the
arch Crowns and Springs
the water way is a Circle
The facing of the Br.K. is
of the red Sandstone which
was procured from
Some of the ruined Temples
and parts of the old
Tank Bunds. Or many
of the stone stones have the
Carving of Elephants
&c — in relief —
In the Rubble Work a
kind of grading stone
is used. The Immundair
Calingulen is on the
N.W. Bank about
3-0 feet from the Aqueduct
and the fall is 12 feet
By placing the Calingulen
Stones accumulations of
Sand & Earth below
near the Emmidekate
Aqueduct was prevented.
And a Considerable
Tank is also saved

This Calingulen is
feet Long.
The entire Brick Work
in the Excavations for the
Br.K was got rid of
by means of Archimedian
Screws and the
usual habit was
by placing in the Cooked
Lot Chapel Baskets.
A Considerable saving
of Cutout and Time
was effected by using
the Screws. The
Lime was procured
from 8 Miles distant
and is of a good
hydraulic Property
The Rates were about
For Cut Stone Work.
10 Rupees —
For Brick Work
3 1/2 Rupees
For Rubble Work
4 Annas
Each per cubic Yard

The Extent of Country
below the Anicut which
may be irrigated by
the Godavery is about
1,000,000 Acres. of
these about 7,00,000

or Rabi are irrigated
at the present time.
The remaining 300 000
have not yet been
irrigated yet. But
there is sufficient command
of water for the purpose
The amount of water
which is calculated
for each acre is
1 Cubic Yards. —
The slopes, sides and
depths of the distributing
Canals are stated
in a Tabular form
which is appended.
Also the quantities of
water the Canals
are capable of supplying

The assessments in the
Jacoms Talookas come
to an average of about
Rs 5-2-2. per acre
They have not yet been
made in all the
Talookas yet.

	Rs as ps
Kursapoor and Shuggarum	5-8-3
Tundi including Tiwaku	4-14-6
	5-5-6
	4-11-6

Assessment on Irrigated Cultivation

The assessment of
Cultivation Canal
Jacoms will be any. de
of accuracy but
Among the Estimates a
about 3 Rupees per
acre.
A Tabular Statement
appended will show
the percentage, Rate
&c --- on Capital
Expended —

A. Thompson
Lt. Madras Engrs

P W 1863 Depte

No 2263.

From Lieut.t R. Thompson
Royal Engineers

Dated
Received 1st July/63.

Encl

Report on the
Irrigation Works &c.
in the Godavery District.

No 7
Logged

2d July/63