

GENERAL.
ACCOUNT.

Govt. of 1880 Madras.

PUBLIC WORKS.

To

THE SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,

&c., &c., &c.

Dated February 7th.

Issued

Recd.

Encl.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statements
of — in the Accounts of Executive Officers
for the month of November 1879 under
Imperial.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General.
Account.

IMPERIAL, BUILDINGS AND ROADS.

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Read the following paper :—

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.									
1	Buckingham Canal. Opening Ennore bar including groyne work.	5	July 1879 ..	..	4,255	4,255	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work has been submitted to the Salt Commissioner for his countersignature on the 6th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
2	Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. Vide paragraph 2 of G.O., No 3,297 W., dated 22nd December 1879.
3	Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.	3. Vide paragraph 6 of G.O., No, 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. " ..	..	295	295	..		
	Total ..	..	..	..	6,250	6,250	..		

PART I.—Irregularities with respect to Estimate up to the month of November 1879—cont.

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVERESTIMATE.								
<i>Bangalore.</i>								
5	General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	1,420	1,750	330	The Executive Engineer reports in his Statement of Objectionable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
<i>North Arcot.</i>								
	Repairing and refitting the flag staff in the Vellore Fort.	1	" ..	210	813	603	The Executive Engineer has not furnished information regarding this work in his Statement of Objectionable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710	

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
<i>Works above Rs. 2,500.</i>								
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	5,000	5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near Kávali to Salt platform.	1	Nov. " ..	..	..	14,972	Vide G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. Vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879.

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1	Opening Ennore bar including groyne work.	5	July 1879 ..	..	4,285	4,285	8 This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W.
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	Repairing and refitting the flag staff in the Vellore Fort.	1	" "	Rs. 210	Rs. 813	Rs. 603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectionable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O. No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
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	Total ..	..	..	..	6,280	6,280		

PART I.—Irregularities with respect to Estimate up to the month of November 1879—*cont.*

Item Number.	Particulars.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
<i>Bangalore.</i>									
6	General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	1,420	1,750	330	1,750	The Executive Engineer reports in his Statement of Objectable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
<i>North Arcot.</i>									
	Repairing and refitting the flag staff in the Vellore Fort.	1	" "	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O. No. 879 W. of 26th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
<i>Works above Rs. 2,500.</i>								
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	5,000	5,000	Completed in October 1879.	6. <i>Vide</i> Chief Engineer's memorandum No. 3,735, dated 8th December 1879.
Guntur	Making a road from trunk road near Kávali to Salt platform.	1	Nov. " "	1	..	14,972	<i>Vide</i> G.O. No. 3,297 W. of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General.
Account.

Read the following paper :—

IMPERIAL, BUILDINGS AND ROADS.

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.									
<i>Buckingham Canal.</i>									
1	Opening Ennore bar including groyne work.	6	July 1879 ..	..	4,285	4,285	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W.
<i>Presidency.</i>									
2	Petty repairs carried out by Barrack Master, Presidency.	6	June " "	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer. 2. <i>Vide</i> paragraph 2 of G.O., No. 3,297 W., dated 22nd December 1879.
<i>Rajahmundry.</i>									
3	Erecting cooking sheds at Rajahmundry.	2	Oct. " "	..	200	200	..	* The Executive Engineer has not furnished any information as regards these works in his Statement of Objectable Items for November 1879. A reference has therefore been made to him on the subject.	3. <i>Vide</i> paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. " "	..	295	295	..		
	Total ..	..	..	..	6,280	6,280	..		

PART I.—Irregularities with respect to Estimate up to the month of November 1879—cont.

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.								
5	Bangalore. General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	1,420	1,750	330	The Executive Engineer reports in his Statement of Objectionable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	North Arcot. Repairing and redetting the flag staff in the Vellore Fort.	1	" "	210	813	603	The Executive Engineer has not furnished information regarding this work in his Statement of Objectionable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	40	
							1,710	

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
Presidency	Works above Rs. 2,500. Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	5,000	5,000	Completed in October 1879.	
Guntūr	Making a road from trunk road near Kārali to Salt platform.	1	Nov. " ..	1	14,972	14,972	Vide G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. Vide Chief Engineer's memorandum No. 3,736, dated 8th December 1879.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General.
Account.

Read the following paper :—

IMPERIAL, BUILDINGS AND ROADS.

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.								
1	Buckingham Canal. Opening Ennore bar including groyne work.	5	July 1879 ..	..	4,285	4,285	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
2	Presidency. Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. Vide paragraph 2 of G.O., No. 3,297 W., dated 22nd December 1879.
3	Rajahmundry. Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.	3. Vide paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. " ..	..	295	295		
	Total ..	..	..	..	6,280	6,280		

PART I.—Irregularities with respect to Estimate up to the month of November 1879—cont.

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
<i>Bangalore.</i>									
5	General repairs to buildings in Parade Barracks,	1	Nov. 1879 ..	1,420	1,750	330	1,750	The Executive Engineer reports in his Statement of Objectionable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	
	<i>North Arcot.</i>								
	Repairing and refitting the flag staff in the Vellore Fort.	1	" "	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectionable Items for November 1879, and a reference has therefore been made to him on the subject.	4. The submission of the revised estimate should be expedited.
	Total ..	..	..	1,630	2,563	933	1,710	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.	

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
<i>Works above Rs. 2,500.</i>								
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	5,000	5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near Kavalu to Salt platform.	1	Nov. " "	1	14,972	14,972	Vide G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. Vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General.
Account.

Read the following paper :—

IMPERIAL, BUILDINGS AND ROADS.

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.									
<i>Buckingham Canal.</i>									
1	Opening Ennore bar including groyne work.	5	July 1879 ..	..	4,285	4,285	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
<i>Presidency.</i>									
2	Petty repairs carried out by Barrack Master, Presidency.	6	June " "	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 817 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. Vide paragraph 2 of G.O. No. 3,297 W., dated 22nd December 1879.
<i>Rajahmundry.</i>									
3	Erecting cooking sheds at Rajahmundry.	2	Oct. " "	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.	3. Vide paragraph 6 of G.O. No. 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. " "	..	295	295	..		
	Total ..	..	..	..	6,280	6,280	..		

PART I.—Irregularities with respect to Estimate up to the month of November 1879—*cont.*

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
<i>Bangalore.</i>									
6	General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,750	Rs. 330	Rs. 1,750	The Executive Engineer reports in his Statement of Objectionable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
<i>North Arcot.</i>									
	Repairing and refitting the flag staff in the Vellore Fort.	1	" "	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectionable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O. No. 879 W. of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.							
<i>Works above Rs. 2,500.</i>							
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	Rs. 5,000	5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near Kávali to Salt platform.	1	Nov. " ..	..	14,972	Vide G.O. No. 3,297 W. of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. Vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General.
Account.

Read the following paper :—

IMPERIAL, BUILDINGS AND ROADS.

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.									
<i>Buckingham Canal.</i>									
1	Opening Ennore bar including groyne work.	6	July 1879 ..	Rs. ..	Rs. 4,285	Rs. 4,285	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
<i>Presidency.</i>									
2	Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. Vide paragraph 2 of G.O. No. 3,297 W., dated 22nd December 1879.
<i>Rajahmundry.</i>									
3	Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.	3. Vide paragraph 6 of G.O. No. 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. " ..	..	295	295	..		
	Total ..	..	..	..	6,280	6,280	..		

PART I.—Irregularities with respect to Estimate up to the month of November 1879—cont.

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
<i>Bengalore.</i>									
6	General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	1,420	1,750	330	1,750	The Executive Engineer reports in his Statement of Objectionable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
<i>North Arcot.</i>									
	Repairing and refitting the flag staff in the Vellore Fort.	1	" "	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectionable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
<i>Works above Rs. 2,500.</i>								
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	5,000	5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near Kavalu to Salt platform.	1	Nov. " ..	1	..	14,972	Vide G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. Vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

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PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.									
<i>Buckingham Canal.</i>									
1	Opening Ennore bar including groyne work.	5	July 1879 ..	..	4,285	4,285	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
2	Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. Vide paragraph 2 of G.O., No. 3,297 W., dated 22nd December 1879.
3	Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.	3. Vide paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. " ..	..	295	295	..		
	Total ..	..	..	..	6,280	6,280	..		

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate	Expenditure up to Date.	Excess over Estimate	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
<i>Bangalore.</i>									
5	General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,750	Rs. 330	Rs. 1,750	The Executive Engineer reports in his Statement of Objectionable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
<i>North Arcot.</i>									
	Repairing and refitting the flag staff in the Vellore Fort.	1	" ..	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectionable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
<i>Works above Rs. 2,500.</i>								
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	Rs. 5,000	5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near Kavalu to Salt platform.	1	Nov. " ..	1	..	14,972	Vide G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. Vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General.
Account.Read the following paper :—
IMPERIAL, BUILDINGS AND ROADS.
PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate	Expenditure up to Date.	Excess over Estimate	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.									
<i>Buckingham Canal.</i>									
1	Opening Ennore bar including groyne work.	6	July 1879 ..	..	4,285	4,285	..	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
<i>Presidency.</i>									
2	Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. Vide paragraph 2 of G.O., No. 3,297 W., dated 22nd December 1879.
<i>Rajahmundry.</i>									
3	Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	200	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.	3. Vide paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. " ..	..	295	295	295		
	Total ..	..	..	..	..	6,280	6,280		

PART I.—Irregularities with respect to Estimate up to the month of November 1879—cont.

Item Number.	Particulars.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
<i>Bangalore.</i>									
6	General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,750	Rs. 330	Rs. 1,750	The Executive Engineer reports in his Statement of Objectable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
<i>North Arcot.</i>									
	Repairing and refitting the flag staff in the Yellore Fort.	1	" ..	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O. No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
<i>Works above Rs. 2,500.</i>								
Presidency ..	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	Rs. 5,000	Rs. 5,000	Completed in October 1879.	6. Vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879,
Guntur ..	Making a road from trunk road near Kavalu to Salt platform.	1	Nov. " ..	1	..	14,972	Vide G.O. No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	

Works below Rs. 2,500.									
Tinnevely ..		..	..	1	745	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.	
Ganjam ..	.....	..	..	1	810	800			
Chingleput ..	.....	..	..	12	1,036	1,116			
Rajahmundry ..	.....	..	..	1	158	156			
Presidency ..	.....	..	..	5	2,795	2,835			

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
" Revenue Department.
" Superintendent of Works, Buckingham Canal.
" Examiner of Public Works Accounts.

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GENERAL.
ACCOUNT.

Govt. of (1880) Madras.
PUBLIC WORKS.

To

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FIFTH CIRCLES,

&c., &c., &c.

Dated February 7th.

Issued

Recd.

Encl.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statement
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Imperial.

PUBLIC WORKS DEPARTMENT, 7TH FEBRUARY 1880, No. 295 W. . . 3

requiring the more punctual submission of these documents.

Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.

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Works below Rs. 2,500.

Tinnevely
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Chingieput
Rajahmundry
Presidency

(True Extract.)

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(True Extract.)

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Works below Rs. 2,500.

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Presidency

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Govt. of (1880) Madras.
PUBLIC WORKS.

Dated February 7th.

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PUBLIC WORKS DEPARTMENT, 7TH FEBRUARY 1880, No. 295 W.

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FEBRUARY.

PUBLIC WORKS DEPARTMENT, 7TH FEBRUARY 1880, No. 295 W. 3

Tinnevely
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Objectionable Items.—Orders on Statement of — in the Accounts of Executive Officers for the month of November 1879 under Imperial.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

10th February 1880, No. 308 W.

Buildings and Roads.
Civil Works.

Read the following paper:—

No. 20. From F. N. THOROWGOOD, Esq., M. INST. C.E., Superintendent, Madras Harbour Works, to the Secretary to Government, Public Works Department, Buildings and Roads, dated Madras, 3rd February 1880, No. 56 W.

I HAVE the honor to submit the following report of the progress on these works during the past month of January, in which only twenty days were available for sub-marine operations, five days having been lost through bad weather and two owing to the New Year and Pongul feast holidays.

2. *North Pier, Superstructure.*—During the twenty days in which they could work the divers were busily engaged at preparing the bed for the blocks in the north pier, but as the rubble bank has been tipped rather high a good deal of excavation had to be carried on, which was met by increasing the force of divers for a time. There have been 184 blocks set in January, advancing the pier by a length of 104 feet, and making the total length from the point B 2,475½ feet. The progress continues now more rapidly as the weather becomes more settled.

3. *North Pier, Rubble Base.*—From the 5th of January the two steam hoppers have been at work depositing rubble base, they have not however done a good month's work, as there have been several delays caused by the giving way of the gear for closing the doors of the stone compartments. I regret to state that I cannot regard these failures as exceptional, but fear that interruptions will constantly be occurring through mishaps on board these vessels, which are rather slightly built for the rough work they have to perform.

4. The total amount of stone deposited in the north pier base in January has been 16,580 tons, of which 12,917 tons were tipped from the steamers, and the remainder from cargo boats, which still have to be employed for finishing the top of the bank after the steamers have done their work.

5. The base of the north pier now terminates in nearly 8 fathoms water, and extends round the curve for a length of 470 feet from the end of the block-work. The amount of rubble stone in this advanced portion is approximately 44,000 tons.

6. *Concrete Block-making.*—I regret to state that we have been entirely dependent upon English cement for making blocks in January, and when that has been used up block-making has had to stop. General Morgan's cement has been of no use to me, and it is to be feared that in one month's time the absence of blocks which should have been made from his December and January cement will cause delay in progress. During the past month 323 blocks were made, 51 of which were made by hand-labour at the south pier.

7. If the local supply of cement had been what I had every reason to believe it would be, there would now be 300 more blocks on hand than is the case at present, and we should have every prospect of being able to make an unequalled amount of

progress in March, the best month in the year. As matters have turned out, however, I much fear that three weeks' delay will be inevitable. On this matter of cement supply I have lately addressed Government (No. 53 W., dated 27th January 1880), but I would take this opportunity of remarking that on a work of this size and nature delays are now becoming so costly that if they can be prevented by sending out cement by steamer the extra charge for freight would not be an absolute loss.

8. *Quarries.*—The outturn from both quarries is now being increased to its maximum rate, and five trains daily are received from each line of railway. During January there were sent from Ambatūr 17,038 tons of laterite, and from Pallāvaram 17,679 tons of stone, giving a total for the month of 34,707 tons. There were twenty-four working days in the month, so that the daily average of stone received has been 1,446 tons.

9. At Pallāvaram on the 19th January I introduced the use of dynamite for blasting, and with most satisfactory results. I am not yet able to give any information as to its cost in quarrying as compared with powder, because at present very little has been used. I am pleased to find the native contractor is very anxious to use it generally.

10. *South Pier, Superstructure.*—At the south pier the progress has been very satisfactory. The rubble base having been neither too high nor too low, the divers' work has been light compared with that at the north pier. In the twenty working days of January 296 blocks were set, and the pier advanced 172 feet, making the total length from the point E on the 31st January 1,891 feet.

11. *South Pier, Rubble Base.*—Work at the base of the south pier has been carried on almost entirely by cargo boats during January, the steamers having been working at the north pier curve. There have been 12,150 tons deposited in the month, of which only 231 tons were tipped from the steam hoppers. The base now extends for a length of 680 feet ahead of the block work, and 450 feet of this length is made up nearly to the finished height. It now terminates in 8 fathoms water, and the curve northward is just commenced. The amount of rubble in advance of the block-work is approximately 48,000 tons.

12. *Protective Works to Beach.*—Very little has been done to the revetment by Mr. Coleman's house in January, as there is no immediate need for putting on much force at that work for a few months. On days when the sea has prevented work at the piers granite boulders have been conveyed along the extension of the line and used to protect the laterite slopes. For this purpose 231 tons of material have been used.

13. *Stores received on Works.*—The following stores have been received on the works during January :—

- 12 Suits, Divers' under clothing, S.S. *Duke of Argyll*.
- 952 Casks Portland cement, S.S. *Ahmora*.
- 15 Do. recovered from S.S. *Penguin* and S.S. *Verona*.
- 99 Sal-wood sleepers, S.S. *Madura*.
- 36 Do. do. S.S. *Chinsura*.
- 40½ Tons General Morgan's Cement (which is rejected).

14. *Plans and Sections.*—I submit herewith the monthly lithographed plan of the Harbour, showing the progress on the two piers in red and the extent of the rubble bases in a dotted line. Also two longitudinal sections of the block-work executed in January. Soundings have been repeatedly taken as a matter of course on both rubble bases, but there has been no opportunity of making such a survey of the base of the north pier as is worthy of being plotted. The outline on the accompanying section represents the north pier base on January 7th. Accurate sections will be taken in February.

15. *Expenditure.*—The total expenditure on the works to January 31st, as shown in this office books, has been Rs. 35,61,100, but to these figures an addition of not less than Rs. 50,000 must be made for cement received but not brought to account, and of about Rs. 16,000 for the sal-wood sleepers from the Forest Department. These amounts bring the liabilities up to about Rs. 37,00,000.

No. 21. ORDER THEREON, 10th February 1880, No. 308 W.

RECORDED.

2. The Superintendent may, if he thinks fit, address Government separately on the subject of the concluding portion of his 7th paragraph.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintendent, Madras Harbour Works.
" Secretary, Harbour Works Committee.
To General Morgan.
Editor's Table.

Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1880) Madras.
PUBLIC WORKS.

To

THE SUPERINTENDENT, MADRAS
HARBOUR WORKS,
&c., &c., &c.

Dated February, 10th.

Issued

Recd.

Encl.

G. O., 10th February 1880, No. 308 W.

FEBRUARY.

Nos. 20 21.

Madras Harbour Works.—Progress Report
for January 1880, recorded with remark.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

10th February 1880, No. 308 W.

Buildings and Roads.
Civil Works.

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No. 21. ORDER THEREON, 10th February 1880, No. 308 W..

RECORDED.

2. The Superintendent may, if he thinks fit, address Government separately on the subject of the concluding portion of his 7th paragraph.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintendent, Madras Harbour Works.
" Secretary, Harbour Works Committee.
To General Morgan.
Editor's Table.

BUILDINGS AND ROADS.
CIVIL WORKS.

Gabt. of (1880) Madras.
PUBLIC WORKS.

To
THE SUPERINTENDENT, MADRAS
HARBOUR WORKS,
&c., &c., &c.

Dated February, 10th.

Issued

Recd.

Encl.

G. O., 10th February 1880, No. 308 W.

FEBRUARY.

Nos. 20 21.

Madras Harbour Works.—Progress Report
for January 1880, recorded with remark.

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PUBLIC WORKS DEPARTMENT.

10th February 1880, No. 308 W.

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Madras Harbour Works, to the Secretary to Government, Public Works
Department, Buildings and Roads, dated Madras, 3rd February 1880,
No. 56 W.

I HAVE the honor to submit the following report of the progress on these works during the past month of January, in which only twenty days were available for sub-marine operations, five days having been lost through bad weather and two owing to the New Year and Pongul feast holidays.

2. *North Pier, Superstructure.*—During the twenty days in which they could work the divers were busily engaged at preparing the bed for the blocks in the north pier, but as the rubble bank has been tipped rather high a good deal of excavation had to be carried on, which was met by increasing the force of divers for a time. There have been 184 blocks set in January, advancing the pier by a length of 104 feet, and making the total length from the point B 2,475½ feet. The progress continues now more rapidly as the weather becomes more settled.

3. *North Pier, Rubble Base.*—From the 5th of January the two steam hoppers have been at work depositing rubble base, they have not however done a good month's work, as there have been several delays caused by the giving way of the gear for closing the doors of the stone compartments. I regret to state that I cannot regard these failures as exceptional, but fear that interruptions will constantly be occurring through mishaps on board these vessels, which are rather slightly built for the rough work they have to perform.

4. The total amount of stone deposited in the north pier base in January has been 16,580 tons, of which 12,917 tons were tipped from the steamers, and the remainder from cargo boats, which still have to be employed for finishing the top of the bank after the steamers have done their work.

5. The base of the north pier now terminates in nearly 8 fathoms water, and extends round the curve for a length of 470 feet from the end of the block-work. The amount of rubble stone in this advanced portion is approximately 44,000 tons.

6. *Concrete Block-making.*—I regret to state that we have been entirely dependent upon English cement for making blocks in January, and when that has been used up block-making has had to stop. General Morgan's cement has been of no use to me, and it is to be feared that in one month's time the absence of blocks which should have been made from his December and January cement will cause delay in progress. During the past month 323 blocks were made, 51 of which were made by hand-labour at the south pier.

7. If the local supply of cement had been what I had every reason to believe it would be, there would now be 300 more blocks on hand than is the case at present, and we should have every prospect of being able to make an unequalled amount of

progress in March, the best month in the year. As matters have turned out, however, I much fear that three weeks' delay will be inevitable. On this matter of cement supply I have lately addressed Government (No. 53 W., dated 27th January 1880), but I would take this opportunity of remarking that on a work of this size and nature delays are now becoming so costly that if they can be prevented by sending out cement by steamer the extra charge for freight would not be an absolute loss.

8. *Quarries.*—The outturn from both quarries is now being increased to its maximum rate, and five trains daily are received from each line of railway. During January there were sent from Ambatūr 17,038 tons of laterite, and from Pallāvaram 17,679 tons of stone, giving a total for the month of 34,707 tons. There were twenty-four working days in the month, so that the daily average of stone received has been 1,446 tons.

9. At Pallāvaram on the 19th January I introduced the use of dynamite for blasting, and with most satisfactory results. I am not yet able to give any information as to its cost in quarrying as compared with powder, because at present very little has been used. I am pleased to find the native contractor is very anxious to use it generally.

10. *South Pier, Superstructure.*—At the south pier the progress has been very satisfactory. The rubble base having been neither too high nor too low, the divers' work has been light compared with that at the north pier. In the twenty working days of January 296 blocks were set, and the pier advanced 172 feet, making the total length from the point E on the 31st January 1,891 feet.

11. *South Pier, Rubble Base.*—Work at the base of the south pier has been carried on almost entirely by cargo boats during January, the steamers having been working at the north pier curve. There have been 12,150 tons deposited in the month, of which only 231 tons were tipped from the steam hoppers. The base now extends for a length of 680 feet ahead of the block work, and 450 feet of this length is made up nearly to the finished height. It now terminates in 8 fathoms water, and the curve northward is just commenced. The amount of rubble in advance of the block-work is approximately 48,000 tons.

12. *Protective Works to Beach.*—Very little has been done to the revetment by Mr. Coleman's house in January, as there is no immediate need for putting on much force at that work for a few months. On days when the sea has prevented work at the piers granite boulders have been conveyed along the extension of the line and used to protect the laterite slopes. For this purpose 231 tons of material have been used.

13. *Stores received on Works.*—The following stores have been received on the works during January:—

- 12 Suits, Divers' under clothing, S.S. *Duke of Argyll*.
- 952 Casks Portland cement, S.S. *Almora*.
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- 99 Sal-wood sleepers, S.S. *Madura*.
- 36 Do. do. S.S. *Chinsura*.
- 40½ Tons General Morgan's Cement (which is rejected).

14. *Plans and Sections.*—I submit herewith the monthly lithographed plan of the Harbour, showing the progress on the two piers in red and the extent of the rubble bases in a dotted line. Also two longitudinal sections of the block-work executed in January. Soundings have been repeatedly taken as a matter of course on both rubble bases, but there has been no opportunity of making such a survey of the base of the north pier as is worthy of being plotted. The outline on the accompanying section represents the north pier base on January 7th. Accurate sections will be taken in February.

15. *Expenditure.*—The total expenditure on the works to January 31st, as shown in this office books, has been Rs. 35,61,100, but to these figures an addition of not less than Rs. 50,000 must be made for cement received but not brought to account, and of about Rs. 16,000 for the sal-wood sleepers from the Forest Department. These amounts bring the liabilities up to about Rs. 37,00,000.

No. 21. ORDER THEREON, 10th February 1880, No. 308 W.

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2. The Superintendent may, if he thinks fit, address Government separately on the subject of the concluding portion of his 7th paragraph.

(True Extract.)

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Secretary to Govt., P.W.D.

To the Superintendent, Madras Harbour Works.
Secretary, Harbour Works Committee.
To General Morgan.
Editor's Table.

Exd. S. T. Austin.
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CIVIL WORKS.

Govt. of (1880) Madras.
PUBLIC WORKS.

To
THE SUPERINTENDENT, MADRAS
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&c., &c., &c.

Dated February, 10th.

Issued

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Encl.

G. O., 10th February 1880, No. 308 W.

FEBRUARY.

Nos. 20 21.

Madras Harbour Works.—Progress Report
for January 1880, recorded with remark.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

10th February 1880, No. 308 W.

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4. The total amount of stone deposited in the north pier base in January has been 16,580 tons, of which 12,917 tons were tipped from the steamers, and the remainder from cargo boats, which still have to be employed for finishing the top of the bank after the steamers have done their work.

5. The base of the north pier now terminates in nearly 3 fathoms water, and extends round the curve for a length of 470 feet from the end of the block-work. The amount of rubble stone in this advanced portion is approximately 44,000 tons.

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PUBLIC WORKS DEPARTMENT, 10TH FEBRUARY 1880, No. 308 W.

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GOVERNMENT OF MADRAS.

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2. The Superintendent may, if he thinks fit, address Government separately on the subject of the concluding portion of his 7th paragraph.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintendent, Madras Harbour Works.
" Secretary, Harbour Works Committee.
To General Morgan.
Editor's Table.

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1880) Madras.
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HARBOUR WORKS,
&c., &c., &c.

Dated February, 10th.

Issued

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Encl.

G. O., 10th February 1880, No. 308 W.

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PUBLIC WORKS DEPARTMENT, 10TH FEBRUARY 1880, No. 308 W.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

10th February 1880, No. 307 W.

Buildings and Roads.
Military Works.

Read the following papers:—

No. 18. From Major-General R. CADELL, R.A., C.B., Inspector-General of Ordnance and Magazines, to the Secretary to Government, Military Department, dated Fort St. George, 6th January 1880, No. G 383.

WITH reference to my letter No. G 323, dated 19th November 1879, I have the honor to state, for the information of His Grace the Governor in Council, that on the 23rd ultimo the Superintendent, Gun Powder Factory, reported as follows with regard to the press-room of the Factory under his charge:—

“Adverting to my letter No. 732, dated 17th November 1879, reporting that the repairs to the press-house at the Gun Powder Factory would be completed by the 1st January 1880, I have now the honor to inform you that the Executive Engineer, Presidency Division, states that brass screws not being procurable at Madras the repairs must necessarily be delayed, and that the press-house cannot be handed over to me on 1st January 1880, as promised, and also that for the same reason the repairs of the barrelling-room were not completed on 20th December 1879 and that building also cannot be handed over at present.

“I have addressed the Executive Engineer, asking why these buildings were taken in hand at a time when the materials necessary for their repair were not available, and will report further on receipt of his reply.”

No. 18-A. Endorsement of the Secretary to Government in the Military Department, dated Fort St. George, 27th January 1880, No. 592.

From Major-General R. CADELL, R.A., C.B., Inspector-General of Ordnance, to the Secretary to Government, Military Department, dated Fort St. George, 26th January 1880, No. G 424.

WITH reference to my letter No. G 383, dated 6th instant, I have the honor to state, for the information of His Grace the Governor in Council, that on the 22nd instant I received the following report from the Superintendent, Gun Powder Factory, in connection with the repairs to be executed to the press-room of the Gun Powder Factory:—

“The Executive Engineer, Presidency Division, states that the reason why he took over the press-house and the barrelling-room of the Gun Powder Factory at a time when the materials necessary for the execution of the repairs sanctioned to those buildings were not available and could not be purchased in the local market was, because, had he waited and not commenced the work until materials were procured, such an arrangement would have retarded the progress of the work, and would have prevented him from completing it before the close of the official year.

“2. I am unable, I confess, to understand what the Executive Engineer, Presidency Division, would imply by the above explanation. He admits that had the materials been available the work would have been finished by 31st December 1879, and that the delay caused by waiting for the materials will postpone such date of completion until 31st January 1880. It seems to me therefore that had the Executive Engineer, Presidency Division, put off the date of commencing the work for one month, and devoted that time to collecting materials, the buildings would still have been finished by 31st January 1880, well within the official year, while the work of this Factory would not have been stopped for one whole month more than appears to

have been absolutely necessary for the actual execution of the repairs, a month which it seems to me has been lost solely in consequence of the press-house having been taken in hand by the Executive Engineer, Presidency Division, at a time when he was not in a position to finish off the work promptly, as he was particularly begged by me to do.

"3. The Executive Engineer, Presidency Division, now informs me that the two buildings under repair will be completed by the 31st January 1880."

TRANSFERRED, with the previous letter, to the Public Works Department.

(By Order.)

(Signed) J. MICHAEL, Colonel,
Secretary to Government.

C.E. No. 346.

FORWARDED to the Superintending Engineer, Third Circle, for remarks.

30th January 1880.

(Signed) J. PENNYCUICK, Major, R.E.,
Ag. Under Secy. to Govt., P.W.D.

No. 18-B. From Major H. M. VIBART, R.E., Acting Superintending Engineer, Third Circle, to the Chief Engineer, Public Works Department, dated Chepauk, 5th February 1880, No. 623.

In returning the enclosures which accompanied your memorandum No. 346, dated 30th January 1880, I have the honor to inform you that the delay complained of by the Ordnance authorities in the progress of the repairs to the press-house at the Gun Powder Factory is due to difficulties which presented themselves after the work was commenced. On dismantling the building, the roof timber was found to be in a much more decayed state than expected when the original estimate was prepared. This necessitated the preparation of a revised estimate, which caused some delay. Again, the timber contractor completely failed to supply good materials; that supplied by him was rejected more than once, and the timber was ultimately procured from the local markets. Brass screws required for the roof and floor work (130 gross) were also not procurable in Madras, nor a single cask of Portland cement. The brass screws had to be telegraphed for from Bombay. The delay in the completion of the work it will be seen was unavoidable, and the date of completion fixed by the Executive Engineer was merely stated as a probable date.

2. In conclusion I wish to point out that it does not seem at all desirable that the Superintendent of the Gun Powder Factory or any other similar official should call upon an Executive Engineer for explanations with regard to the non-progress of a work, and I do not think he ought to be allowed to set himself up as a censor when writing about such matters. If the Superintendent of the Gun Powder Factory thinks he has any reason to be dissatisfied with the progress of the work, he can address his superior officer, the Inspector-General of Ordnance, who would either request the Superintending Engineer to give the matter his attention, or forward the matter for the consideration of Government, taking whichever course he might deem most fit; but I cannot think it proper that an officer of one department should be constantly calling upon an officer of another department for explanation which really do no good, but rather the reverse, as friction between departments is thereby induced which it would be better to avoid.

No. 19. ORDER THEREON, 10th February 1880, No. 307 W.

THE explanation given in paragraph 1 of the Superintending Engineer's letter is accepted, though it may be observed that the impossibility of obtaining the brass

screws and Portland cement might and should have been ascertained before the building was taken over.

2. The principal causes of the delay appear to have been the additional work found necessary when the building was dismantled and the failure of the timber contractor to supply material, and these could not have been foreseen when the work was first put in hand.

3. Much trouble and correspondence would have been saved had the Executive Engineer mentioned these facts when first addressed by the Superintendent instead of confining himself to the very meagre and somewhat unintelligible explanation actually given.

4. His Grace the Governor in Council is unable to concur in the opinions expressed in paragraph 2 of the Superintending Engineer's letter. The Superintendent was perfectly justified in asking for explanation of the reasons for delay in the completion of repairs to a building of great importance to his work, and it was only when he failed to obtain an intelligible explanation from the officer directly concerned that he reported the matter to Government.

5. If the explanation now submitted had been given in the first instance by the Executive Engineer, no necessity would have arisen for a reference to Government and there would have been no friction or misunderstanding.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineer, Third Circle.
" Military Department.

Exd. S. T. Austin.
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MILITARY WORKS.

Govt. of (1880) Madras.
PUBLIC WORKS.

To
THE SUPERINTENDING ENGINEER,
THIRD CIRCLE,
&c., &c., &c.

Dated February 10th.

Issued

Recd.

Encl.

G. O., 10th February 1880, No. 307 W.

FEBRUARY.
Nos. 18-19.

Press-house at the Gun Powder Factory,
Madras.—Orders on explanation regarding
delay in repairing the —.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

10th February 1880, No. 307 W.

Buildings and Roads.
Military Works.

Read the following papers:—

No. 18. From Major-General R. CADELL, R.A., C.B., Inspector-General of Ordnance and Magazines, to the Secretary to Government, Military Department, dated Fort St. George, 6th January 1880, No. G 383.

With reference to my letter No. G 323, dated 19th November 1879, I have the honor to state, for the information of His Grace the Governor in Council, that on the 23rd ultimo the Superintendent, Gun Powder Factory, reported as follows with regard to the press-room of the Factory under his charge:—

"Adverting to my letter No. 732, dated 17th November 1879, reporting that the repairs to the press-house at the Gun Powder Factory would be completed by the 1st January 1880, I have now the honor to inform you that the Executive Engineer, Presidency Division, states that brass screws not being procurable at Madras the repairs must necessarily be delayed, and that the press-house cannot be handed over to me on 1st January 1880, as promised, and also that for the same reason the repairs of the barrelling-room were not completed on 20th December 1879 and that building also cannot be handed over at present.

"I have addressed the Executive Engineer, asking why these buildings were taken in hand at a time when the materials necessary for their repair were not available, and will report further on receipt of his reply."

No. 18-A. Endorsement of the Secretary to Government in the Military Department, dated Fort St. George, 27th January 1880, No. 592.

From Major-General R. CADELL, R.A., C.B., Inspector-General of Ordnance, to the Secretary to Government, Military Department, dated Fort St. George, 26th January 1880, No. G 424.

With reference to my letter No. G 383, dated 6th instant, I have the honor to state, for the information of His Grace the Governor in Council, that on the 22nd instant I received the following report from the Superintendent, Gun Powder Factory, in connection with the repairs to be executed to the press-room of the Gun Powder Factory:—

"The Executive Engineer, Presidency Division, states that the reason why he took over the press-house and the barrelling-room of the Gun Powder Factory at a time when the materials necessary for the execution of the repairs sanctioned to those buildings were not available and could not be purchased in the local market was, because, had he waited and not commenced the work until materials were procured, such an arrangement would have retarded the progress of the work, and would have prevented him from completing it before the close of the official year.

"2. I am unable, I confess, to understand what the Executive Engineer, Presidency Division, would imply by the above explanation. He admits that had the materials been available the work would have been finished by 31st December 1879, and that the delay caused by waiting for the materials will postpone such date of completion until 31st January 1880. It seems to me therefore that had the Executive Engineer, Presidency Division, put off the date of commencing the work for one month, and devoted that time to collecting materials, the buildings would still have been finished by 31st January 1880, well within the official year, while the work of this Factory would not have been stopped for one whole month more than appears to

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"3. The Executive Engineer, Presidency Division, now informs me that the two buildings under repair will be completed by the 31st January 1880."

TRANSFERRED, with the previous letter, to the Public Works Department.

(By Order.)

(Signed) J. MICHAEL, Colonel,
Secretary to Government.

C.E. No. 346.

FORWARDED to the Superintending Engineer, Third Circle, for remarks.

30th January 1880.

(Signed) J. PENNYCUICK, Major, R.E.,
Ag. Under Secy. to Govt., P.W.D.

No. 18-B. From Major H. M. VIBART, R.E., Acting Superintending Engineer, Third Circle, to the Chief Engineer, Public Works Department, dated Chepauk, 5th February 1880, No. 623.

In returning the enclosures which accompanied your memorandum No. 346, dated 30th January 1880, I have the honor to inform you that the delay complained of by the Ordnance authorities in the progress of the repairs to the press-house at the Gun Powder Factory is due to difficulties which presented themselves after the work was commenced. On dismantling the building, the roof timber was found to be in a much more decayed state than expected when the original estimate was prepared. This necessitated the preparation of a revised estimate, which caused some delay. Again, the timber contractor completely failed to supply good materials; that supplied by him was rejected more than once, and the timber was ultimately procured from the local markets. Brass screws required for the roof and floor work (130 gross) were also not procurable in Madras, nor a single cask of Portland cement. The brass screws had to be telegraphed for from Bombay. The delay in the completion of the work it will be seen was unavoidable, and the date of completion fixed by the Executive Engineer was merely stated as a probable date.

2. In conclusion I wish to point out that it does not seem at all desirable that the Superintendent of the Gun Powder Factory or any other similar official should call upon an Executive Engineer for explanations with regard to the non-progress of a work, and I do not think he ought to be allowed to set himself up as a censor when writing about such matters. If the Superintendent of the Gun Powder Factory thinks he has any reason to be dissatisfied with the progress of the work, he can address his superior officer, the Inspector-General of Ordnance, who would either request the Superintending Engineer to give the matter his attention, or forward the matter for the consideration of Government, taking whichever course he might deem most fit; but I cannot think it proper that an officer of one department should be constantly calling upon an officer of another department for explanation which really do no good, but rather the reverse, as friction between departments is thereby induced which it would be better to avoid.

No. 19. ORDER THEREON, 10th February 1880, No. 307 W.

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screws and Portland cement might and should have been ascertained before the building was taken over.

2. The principal causes of the delay appear to have been the additional work found necessary when the building was dismantled and the failure of the timber contractor to supply material, and these could not have been foreseen when the work was first put in hand.

3. Much trouble and correspondence would have been saved had the Executive Engineer mentioned these facts when first addressed by the Superintendent instead of confining himself to the very meagre and somewhat unintelligible explanation actually given.

4. His Grace the Governor in Council is unable to concur in the opinions expressed in paragraph 2 of the Superintending Engineer's letter. The Superintendent was perfectly justified in asking for explanation of the reasons for delay in the completion of repairs to a building of great importance to his work, and it was only when he failed to obtain an intelligible explanation from the officer directly concerned that he reported the matter to Government.

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Exd. S. T. Austin.
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MILITARY WORKS.

Govt. of (1880) Madras.
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Press-house at the Gun Powder Factory,
Madras.—Orders on explanation regarding
delay in repairing the —.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

10th February 1880, No. 307 W.

Buildings and Roads.
Military Works.

Read the following papers:—

No. 18. From Major-General R. CADELL, R.A., C.B., Inspector-General of Ordnance and Magazines, to the Secretary to Government, Military Department, dated Fort St. George, 6th January 1880, No. G 383.

WITH reference to my letter No. G 323, dated 19th November 1879, I have the honor to state, for the information of His Grace the Governor in Council, that on the 23rd ultimo the Superintendent, Gun Powder Factory, reported as follows with regard to the press-room of the Factory under his charge:—

“Adverting to my letter No. 732, dated 17th November 1879, reporting that the repairs to the press-house at the Gun Powder Factory would be completed by the 1st January 1880, I have now the honor to inform you that the Executive Engineer, Presidency Division, states that brass screws not being procurable at Madras the repairs must necessarily be delayed, and that the press-house cannot be handed over to me on 1st January 1880, as promised, and also that for the same reason the repairs of the barrelling-room were not completed on 20th December 1879 and that building also cannot be handed over at present.

“I have addressed the Executive Engineer, asking why these buildings were taken in hand at a time when the materials necessary for their repair were not available, and will report further on receipt of his reply.”

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“The Executive Engineer, Presidency Division, states that the reason why he took over the press-house and the barrelling-room of the Gun Powder Factory at a time when the materials necessary for the execution of the repairs sanctioned to those buildings were not available and could not be purchased in the local market was, because, had he waited and not commenced the work until materials were procured, such an arrangement would have retarded the progress of the work, and would have prevented him from completing it before the close of the official year.

“2. I am unable, I confess, to understand what the Executive Engineer, Presidency Division, would imply by the above explanation. He admits that had the materials been available the work would have been finished by 31st December 1879, and that the delay caused by waiting for the materials will postpone such date of completion until 31st January 1880. It seems to me therefore that had the Executive Engineer, Presidency Division, put off the date of commencing the work for one month, and devoted that time to collecting materials, the buildings would still have been finished by 31st January 1880, well within the official year, while the work of this Factory would not have been stopped for one whole month more than appears to

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TRANSFERRED, with the previous letter, to the Public Works Department.

(By Order.)

(Signed) J. MICHAEL, Colonel,
Secretary to Government.

C.E. No. 346.

FORWARDED to the Superintending Engineer, Third Circle, for remarks.

30th January 1880.

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Ag. Under Secy. to Govt., P.W.D.

No. 18-B. From Major H. M. VIBART, R.E., Acting Superintending Engineer,
Third Circle, to the Chief Engineer, Public Works Department, dated
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In returning the enclosures which accompanied your memorandum No. 346, dated 30th January 1880, I have the honor to inform you that the delay complained of by the Ordnance authorities in the progress of the repairs to the press-house at the Gun Powder Factory is due to difficulties which presented themselves after the work was commenced. On dismantling the building, the roof timber was found to be in a much more decayed state than expected when the original estimate was prepared. This necessitated the preparation of a revised estimate, which caused some delay. Again, the timber contractor completely failed to supply good materials; that supplied by him was rejected more than once, and the timber was ultimately procured from the local markets. Brass screws required for the roof and floor work (130 gross) were also not procurable in Madras, nor a single cask of Portland cement. The brass screws had to be telegraphed for from Bombay. The delay in the completion of the work it will be seen was unavoidable, and the date of completion fixed by the Executive Engineer was merely stated as a probable date.

2. In conclusion I wish to point out that it does not seem at all desirable that the Superintendent of the Gun Powder Factory or any other similar official should call upon an Executive Engineer for explanations with regard to the non-progress of a work, and I do not think he ought to be allowed to set himself up as a censor when writing about such matters. If the Superintendent of the Gun Powder Factory thinks he has any reason to be dissatisfied with the progress of the work, he can address his superior officer, the Inspector-General of Ordnance, who would either request the Superintending Engineer to give the matter his attention, or forward the matter for the consideration of Government, taking whichever course he might deem most fit; but I cannot think it proper that an officer of one department should be constantly calling upon an officer of another department for explanation which really do no good, but rather the reverse, as friction between departments is thereby induced which it would be better to avoid.

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ORDER THEREON, 10th February 1880, No. 307 W.

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screws and Portland cement might and should have been ascertained before the building was taken over.

2. The principal causes of the delay appear to have been the additional work found necessary when the building was dismantled and the failure of the timber contractor to supply material, and these could not have been foreseen when the work was first put in hand.

3. Much trouble and correspondence would have been saved had the Executive Engineer mentioned these facts when first addressed by the Superintendent instead of confining himself to the very meagre and somewhat unintelligible explanation actually given.

4. His Grace the Governor in Council is unable to concur in the opinions expressed in paragraph 2 of the Superintending Engineer's letter. The Superintendent was perfectly justified in asking for explanation of the reasons for delay in the completion of repairs to a building of great importance to his work, and it was only when he failed to obtain an intelligible explanation from the officer directly concerned that he reported the matter to Government.

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To the Superintending Engineer, Third Circle.
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Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
MILITARY WORKS.

Gobt. of (1880) Madras.
PUBLIC WORKS.

To
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&c. &c. &c.

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PUBLIC WORKS DEPARTMENT.

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Buildings and Roads.
Military Works.

Read the following papers:—

No. 18. From Major-General R. CADELL, R.A., C.B., Inspector-General of Ordnance and Magazines, to the Secretary to Government, Military Department, dated Fort St. George, 6th January 1880, No. G 383.

With reference to my letter No. G 323, dated 19th November 1879, I have the honor to state, for the information of His Grace the Governor in Council, that on the 23rd ultimo the Superintendent, Gun Powder Factory, reported as follows with regard to the press-room of the Factory under his charge:—

“Adverting to my letter No. 732, dated 17th November 1879, reporting that the repairs to the press-house at the Gun Powder Factory would be completed by the 1st January 1880, I have now the honor to inform you that the Executive Engineer, Presidency Division, states that brass screws not being procurable at Madras the repairs must necessarily be delayed, and that the press-house cannot be handed over to me on 1st January 1880, as promised, and also that for the same reason the repairs of the barrelling-room were not completed on 20th December 1879 and that building also cannot be handed over at present.

“I have addressed the Executive Engineer, asking why these buildings were taken in hand at a time when the materials necessary for their repair were not available, and will report further on receipt of his reply.”

No. 18-A. Endorsement of the Secretary to Government in the Military Department, dated Fort St. George, 27th January 1880, No. 592.

From Major-General R. CADELL, R.A., C.B., Inspector-General of Ordnance, to the Secretary to Government, Military Department, dated Fort St. George, 26th January 1880, No. G 424.

With reference to my letter No. G 383, dated 6th instant, I have the honor to state, for the information of His Grace the Governor in Council, that on the 22nd instant I received the following report from the Superintendent, Gun Powder Factory, in connection with the repairs to be executed to the press-room of the Gun Powder Factory:—

“The Executive Engineer, Presidency Division, states that the reason why he took over the press-house and the barrelling-room of the Gun Powder Factory at a time when the materials necessary for the execution of the repairs sanctioned to those buildings were not available and could not be purchased in the local market was, because, had he waited and not commenced the work until materials were procured, such an arrangement would have retarded the progress of the work, and would have prevented him from completing it before the close of the official year.

“2. I am unable, I confess, to understand what the Executive Engineer, Presidency Division, would imply by the above explanation. He admits that had the materials been available the work would have been finished by 31st December 1879, and that the delay caused by waiting for the materials will postpone such date of completion until 31st January 1880. It seems to me therefore that had the Executive Engineer, Presidency Division, put off the date of commencing the work for one month, and devoted that time to collecting materials, the buildings would still have been finished by 31st January 1880, well within the official year, while the work of this Factory would not have been stopped for one whole month more than appears to

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"3. The Executive Engineer, Presidency Division, now informs me that the two buildings under repair will be completed by the 31st January 1880."

TRANSFERRED, with the previous letter, to the Public Works Department.

(By Order.)

(Signed) J. MICHAEL, Colonel,
Secretary to Government.

C.E. No. 346.

FORWARDED to the Superintending Engineer, Third Circle, for remarks.

30th January 1880.

(Signed) J. PENNYCUICK, Major, R.E.,
Ag. Under Secy. to Govt., P.W.D.

No. 18-B. From Major H. M. VIBART, R.E., Acting Superintending Engineer,
Third Circle, to the Chief Engineer, Public Works Department, dated
Chepauk, 5th February 1880, No. 623.

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2. In conclusion I wish to point out that it does not seem at all desirable that the Superintendent of the Gun Powder Factory or any other similar official should call upon an Executive Engineer for explanations with regard to the non-progress of a work, and I do not think he ought to be allowed to set himself up as a censor when writing about such matters. If the Superintendent of the Gun Powder Factory thinks he has any reason to be dissatisfied with the progress of the work, he can address his superior officer, the Inspector-General of Ordnance, who would either request the Superintending Engineer to give the matter his attention, or forward the matter for the consideration of Government, taking whichever course he might deem most fit; but I cannot think it proper that an officer of one department should be constantly calling upon an officer of another department for explanation which really do no good, but rather the reverse, as friction between departments is thereby induced which it would be better to avoid.

No. 19. ORDER THEREON, 10th February 1880, No. 307 W.

THE explanation given in paragraph 1 of the Superintending Engineer's letter is accepted, though it may be observed that the impossibility of obtaining the brass

screws and Portland cement might and should have been ascertained before the building was taken over.

2. The principal causes of the delay appear to have been the additional work found necessary when the building was dismantled and the failure of the timber contractor to supply material, and these could not have been foreseen when the work was first put in hand.

3. Much trouble and correspondence would have been saved had the Executive Engineer mentioned these facts when first addressed by the Superintendent instead of confining himself to the very meagre and somewhat unintelligible explanation actually given.

4. His Grace the Governor in Council is unable to concur in the opinions expressed in paragraph 2 of the Superintending Engineer's letter. The Superintendent was perfectly justified in asking for explanation of the reasons for delay in the completion of repairs to a building of great importance to his work, and it was only when he failed to obtain an intelligible explanation from the officer directly concerned that he reported the matter to Government.

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Secretary to Govt., P.W.D.

To the Superintending Engineer, Third Circle.
" Military Department.

Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
MILITARY WORKS.

Govt. of (1880) Madras.

PUBLIC WORKS.

To

THE SUPERINTENDING ENGINEER,
THIRD CIRCLE,
&c., &c., &c.

Dated February 10th.

Issued

Recd.

Encl.

G. O., 10th February 1880, No. 307 W.

FEBRUARY.

Nos. 18-19.

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Madras.—Orders on explanation regarding
delay in repairing the —.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

10th February 1880, No. 307 W.

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MILITARY WORKS.

Gobt. of (1880) Madras.
PUBLIC WORKS.

To
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THIRD CIRCLE,
&c., &c., &c.

Dated February 10th.

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"Adverting to my letter No. 732, dated 17th November 1879, reporting that the repairs to the press-house at the Gun Powder Factory would be completed by the 1st January 1880, I have now the honor to inform you that the Executive Engineer, Presidency Division, states that brass screws not being procurable at Madras the repairs must necessarily be delayed, and that the press-house cannot be handed over to me on 1st January 1880, as promised, and also that for the same reason the repairs of the barrelling-room were not completed on 20th December 1879 and that building also cannot be handed over at present.

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4. His Grace the Governor in Council is unable to concur in the opinions expressed in paragraph 2 of the Superintending Engineer's letter. The Superintendent was perfectly justified in asking for explanation of the reasons for delay in the completion of repairs to a building of great importance to his work, and it was only when he failed to obtain an intelligible explanation from the officer directly concerned that he reported the matter to Government.

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To the Superintending Engineer, Third Circle.
" Military Department.

Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
MILITARY WORKS.

Govt. of (1880) Madras.
PUBLIC WORKS.

To
THE SUPERINTENDING ENGINEER,
THIRD CIRCLE,
&c., &c., &c.

Dated February 10th.

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“The Executive Engineer, Presidency Division, states that the reason why he took over the press-house and the barrelling-room of the Gun Powder Factory at a time when the materials necessary for the execution of the repairs sanctioned to those buildings were not available and could not be purchased in the local market was, because, had he waited and not commenced the work until materials were procured, such an arrangement would have retarded the progress of the work, and would have prevented him from completing it before the close of the official year.

“2. I am unable, I confess, to understand what the Executive Engineer, Presidency Division, would imply by the above explanation. He admits that had the materials been available the work would have been finished by 31st December 1879, and that the delay caused by waiting for the materials will postpone such date of completion until 31st January 1880. It seems to me therefore that had the Executive Engineer, Presidency Division, put off the date of commencing the work for one month, and devoted that time to collecting materials, the buildings would still have been finished by 31st January 1880, well within the official year, while the work of this Factory would not have been stopped for one whole month more than appears to

BUILDINGS AND ROADS.
MILITARY WORKS.

Govt. of (1880) Madras.

PUBLIC WORKS.

To
THE SUPERINTENDING ENGINEER,
THIRD CIRCLE,
&c. &c. &c.

Dated February 10th.

Issued

Recd.

Encl.

G. O., 10th February 1880, No. 307 W.

FEBRUARY.

Nos. 13-19.

Press-house at the Gun Powder Factory,
Madras.—Orders on explanation regarding
delay in repairing the —.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

10th February 1880, No. 307 W.

Buildings and Roads.
Military Works.

Read the following papers:—

No. 18. From Major-General R. CADELL, R.A., C.B., Inspector-General of Ordnance and Magazines, to the Secretary to Government, Military Department, dated Fort St. George, 6th January 1880, No. G 383.

WITH reference to my letter No. G 323, dated 19th November 1879, I have the honor to state, for the information of His Grace the Governor in Council, that on the 23rd ultimo the Superintendent, Gun Powder Factory, reported as follows with regard to the press-room of the Factory under his charge:—

“Adverting to my letter No. 732, dated 17th November 1879, reporting that the repairs to the press-house at the Gun Powder Factory would be completed by the 1st January 1880, I have now the honor to inform you that the Executive Engineer, Presidency Division, states that brass screws not being procurable at Madras the repairs must necessarily be delayed, and that the press-house cannot be handed over to me on 1st January 1880, as promised, and also that for the same reason the repairs of the barrelling-room were not completed on 20th December 1879 and that building also cannot be handed over at present.

“I have addressed the Executive Engineer, asking why these buildings were taken in hand at a time when the materials necessary for their repair were not available, and will report further on receipt of his reply.”

No. 18-A. Endorsement of the Secretary to Government in the Military Department, dated Fort St. George, 27th January 1880, No. 592.

From Major-General R. CADELL, R.A., C.B., Inspector-General of Ordnance, to the Secretary to Government, Military Department, dated Fort St. George, 26th January 1880, No. G 424.

WITH reference to my letter No. G 383, dated 6th instant, I have the honor to state, for the information of His Grace the Governor in Council, that on the 22nd instant I received the following report from the Superintendent, Gun Powder Factory, in connection with the repairs to be executed to the press-room of the Gun Powder Factory:—

“The Executive Engineer, Presidency Division, states that the reason why he took over the press-house and the barrelling-room of the Gun Powder Factory at a time when the materials necessary for the execution of the repairs sanctioned to those buildings were not available and could not be purchased in the local market was, because, had he waited and not commenced the work until materials were procured, such an arrangement would have retarded the progress of the work, and would have prevented him from completing it before the close of the official year.

“2. I am unable, I confess, to understand what the Executive Engineer, Presidency Division, would imply by the above explanation. He admits that had the materials been available the work would have been finished by 31st December 1879, and that the delay caused by waiting for the materials will postpone such date of completion until 31st January 1880. It seems to me therefore that had the Executive Engineer, Presidency Division, put off the date of commencing the work for one month, and devoted that time to collecting materials, the buildings would still have been finished by 31st January 1880, well within the official year, while the work of this Factory would not have been stopped for one whole month more than appears to

have been absolutely necessary for the actual execution of the repairs, a month which it seems to me has been lost solely in consequence of the press-house having been taken in hand by the Executive Engineer, Presidency Division, at a time when he was not in a position to finish off the work promptly, as he was particularly begged by me to do.

"3. The Executive Engineer, Presidency Division, now informs me that the two buildings under repair will be completed by the 31st January 1880."

TRANSFERRED, with the previous letter, to the Public Works Department.

(By Order.)

(Signed) J. MICHAEL, Colonel,
Secretary to Government.

C.E. No. 346.

FORWARDED to the Superintending Engineer, Third Circle, for remarks.

30th January 1880. (Signed) J. PENNYCUICK, Major, R.E.,
Ag. Under Secy. to Govt., P.W.D.

No. 18-B. From Major H.M. VIBART, R.E., Acting Superintending Engineer,
Third Circle, to the Chief Engineer, Public Works Department, dated
Chepauk, 5th February 1880, No. 623.

In returning the enclosures which accompanied your memorandum No. 346, dated 30th January 1880, I have the honor to inform you that the delay complained of by the Ordnance authorities in the progress of the repairs to the press-house at the Gun Powder Factory is due to difficulties which presented themselves after the work was commenced. On dismantling the building, the roof timber was found to be in a much more decayed state than expected when the original estimate was prepared. This necessitated the preparation of a revised estimate, which caused some delay. Again, the timber contractor completely failed to supply good materials; that supplied by him was rejected more than once, and the timber was ultimately procured from the local markets. Brass screws required for the roof and floor work (130 gross) were also not procurable in Madras, nor a single cask of Portland cement. The brass screws had to be telegraphed for from Bombay. The delay in the completion of the work it will be seen was unavoidable, and the date of completion fixed by the Executive Engineer was merely stated as a probable date.

2. In conclusion I wish to point out that it does not seem at all desirable that the Superintendent of the Gun Powder Factory or any other similar official should call upon an Executive Engineer for explanations with regard to the non-progress of a work, and I do not think he ought to be allowed to set himself up as a censor when writing about such matters. If the Superintendent of the Gun Powder Factory thinks he has any reason to be dissatisfied with the progress of the work, he can address his superior officer, the Inspector-General of Ordnance, who would either request the Superintending Engineer to give the matter his attention, or forward the matter for the consideration of Government, taking whichever course he might deem most fit; but I cannot think it proper that an officer of one department should be constantly calling upon an officer of another department for explanation which really do no good, but rather the reverse, as friction between departments is thereby induced which it would be better to avoid.

No. 19.

ORDER THEREON, 10th February 1880, No. 307 W.

The explanation given in paragraph 1 of the Superintending Engineer's letter is accepted, though it may be observed that the impossibility of obtaining the brass

screws and Portland cement might and should have been ascertained before the building was taken over.

2. The principal causes of the delay appear to have been the additional work found necessary when the building was dismantled and the failure of the timber contractor to supply material, and these could not have been foreseen when the work was first put in hand.

3. Much trouble and correspondence would have been saved had the Executive Engineer mentioned these facts when first addressed by the Superintendent instead of confining himself to the very meagre and somewhat unintelligible explanation actually given.

4. His Grace the Governor in Council is unable to concur in the opinions expressed in paragraph 2 of the Superintending Engineer's letter. The Superintendent was perfectly justified in asking for explanation of the reasons for delay in the completion of repairs to a building of great importance to his work, and it was only when he failed to obtain an intelligible explanation from the officer directly concerned that he reported the matter to Government.

5. If the explanation now submitted had been given in the first instance by the Executive Engineer, no necessity would have arisen for a reference to Government and there would have been no friction or misunderstanding.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineer, Third Circle.
" Military Department.

Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
MILITARY WORKS.

Gobt. of (1880) Madras.
PUBLIC WORKS.

To
THE SUPERINTENDING ENGINEER,
THIRD CIRCLE,
&c. &c. &c.

Dated February 10th.

Issued 20/2/80

Recd. Encl.

G. O., 10th February 1880, No. 307 W.

FEBRUARY.

Nos. 18-19.

*Press-house at the Gun Powder Factory
Madras.—Orders on explanation regarding
delay in repairing the —.*

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

10th February 1880, No. 307 W.

Buildings and Roads.
Military Works.

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“I have addressed the Executive Engineer, asking why these buildings were taken in hand at a time when the materials necessary for their repair were not available, and will report further on receipt of his reply.”

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“2. I am unable, I confess, to understand what the Executive Engineer, Presidency Division, would imply by the above explanation. He admits that had the materials been available the work would have been finished by 31st December 1879, and that the delay caused by waiting for the materials will postpone such date of completion until 31st January 1880. It seems to me therefore that had the Executive Engineer, Presidency Division, put off the date of commencing the work for one month, and devoted that time to collecting materials, the buildings would still have been finished by 31st January 1880, well within the official year, while the work of this Factory would not have been stopped for one whole month more than appears to

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"3. The Executive Engineer, Presidency Division, now informs me that the two buildings under repair will be completed by the 31st January 1880."

TRANSFERRED, with the previous letter, to the Public Works Department.

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(Signed) J. MICHAEL, Colonel,
Secretary to Government.

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In returning the enclosures which accompanied your memorandum No. 346, dated 30th January 1880, I have the honor to inform you that the delay complained of by the Ordnance authorities in the progress of the repairs to the press-house at the Gun Powder Factory is due to difficulties which presented themselves after the work was commenced. On dismantling the building, the roof timber was found to be in a much more decayed state than expected when the original estimate was prepared. This necessitated the preparation of a revised estimate, which caused some delay. Again, the timber contractor completely failed to supply good materials; that supplied by him was rejected more than once, and the timber was ultimately procured from the local markets. Brass screws required for the roof and floor work (130 gross) were also not procurable in Madras, nor a single cask of Portland cement. The brass screws had to be telegraphed for from Bombay. The delay in the completion of the work it will be seen was unavoidable, and the date of completion fixed by the Executive Engineer was merely stated as a probable date.

2. In conclusion I wish to point out that it does not seem at all desirable that the Superintendent of the Gun Powder Factory or any other similar official should call upon an Executive Engineer for explanations with regard to the non-progress of a work, and I do not think he ought to be allowed to set himself up as a censor when writing about such matters. If the Superintendent of the Gun Powder Factory thinks he has any reason to be dissatisfied with the progress of the work, he can address his superior officer, the Inspector-General of Ordnance, who would either request the Superintending Engineer to give the matter his attention, or forward the matter for the consideration of Government, taking whichever course he might deem most fit; but I cannot think it proper that an officer of one department should be constantly calling upon an officer of another department for explanation which really do no good, but rather the reverse, as friction between departments is thereby induced which it would be better to avoid.

No. 19. ORDER THEREON, 10th February 1880, No. 307 W.

The explanation given in paragraph 1 of the Superintending Engineer's letter is accepted, though it may be observed that the impossibility of obtaining the brass

screws and Portland cement might and should have been ascertained before the building was taken over.

2. The principal causes of the delay appear to have been the additional work found necessary when the building was dismantled and the failure of the timber contractor to supply material, and these could not have been foreseen when the work was first put in hand.

3. Much trouble and correspondence would have been saved had the Executive Engineer mentioned these facts when first addressed by the Superintendent instead of confining himself to the very meagre and somewhat unintelligible explanation actually given.

4. His Grace the Governor in Council is unable to concur in the opinions expressed in paragraph 2 of the Superintending Engineer's letter. The Superintendent was perfectly justified in asking for explanation of the reasons for delay in the completion of repairs to a building of great importance to his work, and it was only when he failed to obtain an intelligible explanation from the officer directly concerned that he reported the matter to Government.

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(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineer, Third Circle.
" Military Department.

Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
MILITARY WORKS.

Govt. of (1880) Madras.
PUBLIC WORKS.

To
THE SUPERINTENDING ENGINEER,
THIRD CIRCLE,
&c. &c. &c.

Dated February 10th.

Issued

Recd.

Encl.

G. O., 10th February 1880, No. 307 W.

FEBRUARY.
Nos. 18-19.

Press-house at the Gun Powder Factory,
Madras.—Orders on explanation regarding
delay in repairing the —.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General.
Account.

Read the following paper:—

IMPERIAL, BUILDINGS AND ROADS.

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appear- ances in Statements of Objec- tionable Items.	Month in the Accounts of which Objec- tionable Expenditure first appeared.	Amount of Estimate	Expendi- ture up to Date.	Excess over Estimate	Expendi- ture during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
1	WITHOUT ESTIMATE. <i>Buckingham Canal.</i> Opening Ennore bar includ- ing groyne work.	5	July 1879 ..	..	4,285	4,285	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
2	<i>Presidency.</i> Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. <i>Vide</i> paragraph 2 of G.O., No. 3,297 W., dated 22nd December 1879.
3	<i>Rajahmundry.</i> Erecting cooking sheds at	2	Oct. " ..	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has there- fore been made to him on the subject.	3. <i>Vide</i> paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.
4	Rajahmundry. Erecting barracks at Rajah- mundry and Ellore.	2	Oct. " ..	..	295	295	..		
..	Total ..	..	..	..	6,280	6,280	..		

2
PART I.—Irregularities with respect to Estimate up to the month of November 1879—cont.

Item Number.	Particulars.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate	Expenditure up to Date.	Excess over Estimate	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
5	<i>Bangalore.</i> General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	1,420	1,750	330	1,760	The Executive Engineer reports in his Statement of Objectable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	<i>North Arcot.</i> Repairing and retilting the flag staff in the Vellore Fort.	1	" ..	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 26th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER. <i>Works above Rs. 2,500.</i>								
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	5,000	5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near Kaval to Salt platform.	1	Nov. " ..	1	..	14,972	<i>Vide</i> G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. <i>Vide</i> Chief Engineer's memorandum No. 3,735, dated 8th December 1879.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General.
Account.

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WITHOUT ESTIMATE.									
1	<i>Buckingham Canal.</i> Opening Ennore bar including groyne work.	5	July 1879 ..	..	4,285	4,285	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
2	<i>Presidency.</i> Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. <i>Vide</i> paragraph 2 of G.O., No. 3,297 W., dated 22nd December 1879.
3	<i>Rajahmundry.</i> Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectable Items for November 1879. A reference has therefore been made to him on the subject.	3. <i>Vide</i> paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.
4	Erecting barrack at Rajahmundry and Ellore.	2	Oct. " ..	..	295	295	..		
	Total ..	..	..	..	6,280	6,280	..		

PART I.—Irregularities with respect to Estimate up to the month of November 1879—*cont.*

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.								
<i>Bangalore.</i>								
5	General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	1,420	1,750	330	The Executive Engineer reports in his Statement of Objectionable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
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	Repairing and refitting the flag staff in the Vellore Fort.	1	" "	210	813	603	The Executive Engineer has not furnished information regarding this work in his Statement of Objectionable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
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COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
<i>Works above Rs. 2,500.</i>								
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	5,000	5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near Kávali to Salt platform.	1	Nov. " ..	1	..	14,972	Vide G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. Vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879,

Tinnevely	..	..	..	1	745	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.
Ganjam	..	..	..	1	810	800		
Chingteput	..	..	..	12	1,036	1,116		
Rajahmundry	..	..	..	1	188	156		
Presidency	..	..	..	5	2,795	2,835		

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
 " Revenue Department.
 " Superintendent of Works, Buckingham Canal.
 " Examiner of Public Works Accounts.

Exd. S. T. Austin.
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814
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GENERAL.
ACCOUNT.

Govt. of (1880) Madras.
PUBLIC WORKS.

To

THE SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,
&c., &c., &c.

Dated February 7th.

Issued

Recd.

Encl.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statement
of — in the Accounts of Executive Officers
for the month of November 1879 under
Imperial.

PUBLIC WORKS DEPARTMENT, 7TH FEBRUARY 1880, No. 295 W.

3

	Works below Rs. 2,500.						Government are particularly re- quested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punc- tual submission of these documents.
Tinnevely		1	745	744	744	744	744	744
Ganjam		1	810	800	800	800	800	800
Chingleput		12	1,036	1,116	1,116	1,116	1,116	1,116
Rajahmundry		1	158	156	156	156	156	156
Presidency		5	2,795	2,835	2,835	2,835	2,835	2,835

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

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there reconstructed 100 yards in length, lowest point of invert being 1 foot above H.W.L. The materials of the present dam will nearly suffice for the new, and the same style of tail apron should be employed. The western embankment of the canal (south of the bridge) should be much strengthened, and the road well raised over the site of the present dam, so as effectually to prevent any future invasion by flood water. The laterite bridge, which with its nine elliptical arches of 18 feet span carries off all the residue of the Tondairoo drainage not vented by the canal, should be thoroughly repaired as its flooring is still sound. The unworkman-like additions made on either side of the arches to bear the parapets, and which were much injured by the November flood, must be removed and the roadway reduced to about $9\frac{1}{2}$ feet in width. The removal and reconstruction of the road dam above adverted to must be charged to the canal, but the alterations of the bridge ought to devolve on the Local Fund Board, who may also fairly undertake the construction of the proposed Moosafirkhana at Utopatu.

44. Paragraphs 59, 60, 61.—Northward from Kottapatnam (179 to 187 M.) the banks originally low have suffered severely during the November cyclone, first by the action of the storm wave from the east, there being no protecting "dunes" here, and second, from the land flood which supervened. But notwithstanding this destruction of the banks the channel has been, if any thing, improved owing to the fact that the surplus of the Moosee river flood vented itself through the Tondairoo creek, and finding its way into the canal scoured it throughout and cleared it of silt. Practically, therefore, little work is required in this reach. In a few places a strong, well planted, east bank will be needed to counteract the action of a storm wave; but on the west the less obstruction presented to the land flood the better, unless at some future time the expense of a sufficiently high and strong isolating west bank be considered essential. As matters stand, levelling down the bank as much as possible and bringing the tow-path into order is all that need be thought of. No vegetation seems to thrive here owing to the salt dust carried by the west winds which smothers and kills even the "woolsa" rush and the salt plant "eela," both of which thrive elsewhere. So long as the channel is not isolated no flood-gate is necessary at the Gundlakamma.

45. Paragraph 62.—The crossing of the Gundlakamma river calls for no special remark.

46. Paragraph 63.—As regards the proposals in this paragraph I have seen reason for the present at least to prefer flood-gates nearly everywhere to locks, the grounds for which will be found elsewhere.

47. Paragraph 64.—For five miles the Gundlakamma river the canal is exposed to serious wash, particularly in two places where bars opened in the November cyclone, and which must be left free of any obstruction. To all appearances, however, the spill water from the Gundlakamma might, as suggested by Sub-Engineer Ottmann, be effectually checked by constructing a strong training bank along the left bank of the river, two or three miles in length, and diverting the drainage from the Kanuparti swamp. The alternative to this plan would be to construct a strong west bank all along the canal. In addition to protection on the west, a well-planted east bank is also needed at two places, but only for short lengths. Major Vibart has suggested an entirely new channel between $199\frac{1}{2}$ and $191\frac{1}{2}$ M. but as the object here must be to get sufficiently inland from the Kanuparti bar, to which the present line is dangerously near, it will suffice to make the new cut to the westward of only three furlongs in length at a distance of 200 yards from the existing channel.

48. Paragraphs 66, 67, 68.—Little remark called for. It may be doubted whether the position of the new lock at Feringy Dibba has been judiciously selected, and whether, looking to the great drainage which sweeps over the whole country south of Santaravoor, it would not have been safer to have given another flight to this latter lock, and dropped the canal thus direct into the Rompairoo drainage. It is now however too late to suggest any alteration of the arrangements here.

49. Paragraph 69.—The reasoning here employed by Major Vibart in favor of isolating the different reaches of the canal which intervene between drainages that cannot safely, particularly during flood, be barred in the passage to the sea, derives additional force from the effects of the November cyclone which followed on the

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one which occurred in May and which is the subject of his report. But there is such a strong and, it must be admitted, well-founded objection to the delays inseparable from locks, added to the great expense of first construction and subsequent working, a regular establishment being necessary for each all the year round, that I have proposed for the present at least to construct flood-gates at the end of each reach. These would only be closed on extreme occasions to exclude silt and flood from the channel. They would be comparatively cheap in construction, could be made portions of locks at any future time should such be considered requisite, would in no way interfere with or delay traffic, and need only have a small establishment to look after them in the cyclone or flood period. Inlet weirs I also see no immediate necessity for, but the depth of the canal and even its section may now with advantage be much diminished to meet actual requirements. These and other subjects will however be discussed in a separate paper.

50. Paragraph 70.—The training of the several large drainages, and the necessity for a special study of each case, has been sufficiently pointed out in the above remarks, but here, as elsewhere, Major Vibart seems to favor the use of inlets and outlets of masonry for the disposal of minor drainages. I very much question the applicability of works of this character to the canal, as in hardly any case is there means of securing a proper outfall for the water on the down or eastern side of the channel. There may however be a few cases in which the principle might be accepted, and where this is the case the plan might be tried, adding however a capacious silt trap on the upper or west side of the canal. This should be kept always clear. It seems to me that all drainages which cannot be effectually shut out and diverted into other lines must of necessity be allowed free vent at a level across the canal, and that everything in the shape of an obstruction would be a mistake.

CHEPAUK,
10th April 1880.

R. H. SANKEY, Colonel, R.E.,
Chief Engineer.

Appendix to G.O., No. 284 W., of 6th February 1880.

OBSERVATIONS BY THE CHIEF ENGINEER ON MAJOR VIBART'S BUCKINGHAM CANAL INSPECTION NOTES DATED 27TH SEPTEMBER 1879.

Paragraph 1.—The requisite survey establishment has been sanctioned, and the Superintendent of Works, Captain Awdry, is engaged in preparing the estimate for submission to the Government of India. Tide gauges have been established in all backwaters and open estuaries, as also at intermediate points along the canal.

2. *Paragraph 3.*—For sanitary purposes it is most desirable that the level of the water in the Cocum and Adyar rivers should, as far as possible, be maintained at 3.5 feet above mean sea level, and to do this the lock here proposed would be indispensable, as with the Covelong bar open (maximum rise of tide 2.92 feet above and low water 0.70 below M.S.L.) the water would otherwise escape through the southern canal. The necessity for constructing a dam here is not sufficiently apparent to warrant the work being included in the estimate as yet.

3. *Paragraph 4.*—Under the present arrangements for taking the tolls, the proposed landing place would not help traffic, but Captain Awdry has a proposal for altering the sections so soon as the channel shall be open as far as the Cheyoor backwater, which if combined with a proper opening, headway being given to the South Indian Railway bridge, would permit and encourage traffic through the Junction Canal.

4. *Paragraph 5.*—Appended is a detailed statement of the spans and headways of the bridges, the former being generally under 20 feet each, and the latter as low as 9.22 feet at M.S.L. The headway is thus only 5.72 feet when the level of the water is 3.5 feet above M.S.L., and is therefore much too low. The expense of altering all these bridges, fourteen in number, would be prohibitory for the present, but means should be found by corbeling or otherwise to provide an 18-inch wide board for the towing coolies to pass. To prevent water escaping from the Cocum when the Adyar bar is open, a lock should be built at south end of the Junction Canal. So long as it can be managed without injury to the channel or the bridges a scour may be provided for in order to remove silt.

STATEMENT showing the clear headway and span of Bridges over the Buckingham Canal.

Mileage from Basin.	Name of Bridges.	Minimum span at M.S.L. in feet.	Maximum height above M.S.L. in feet.	Remarks.	Height available above M.S.L. for boats	
					With tops 10 feet wide.	With tops 13 feet wide.
M. F.	Bridges north of Cochrane's Basin.					
0 4	Ráyapuram Railway bridge ..	59	10.72	Iron girder bridge ..	10.72	10.72
1 4½	Washermanpettah bridge ..	43	10.00	Masonry segmental arch ..	9.60	9.40
3 6	Theroovattoor bridge ..	43	10.00	Do. do. ..	9.68	9.36

Statement showing the clear headway and span of Bridges over the Buckingham Canal—cont.

Mileage from Basin.	Name of Bridges.	Minimum span at M.S.L. in feet.	Maximum height above M.S.L. in feet.	Remarks.	Height available above M.S.L. for boats	
					With tops 10 feet wide.	With tops 13 feet wide.
Bridges south of Basin.						
0 0	Basin bridge	50-00	12-52	Masonry segmental arch ..	12-17	11-94
0 4	Salt Cotaur bridge	29-66	8-64	Wooden bridge	8-64	8-64
0 6½	Elephant Gate bridge ..	49-00	10-94	Masonry segmental arch ..	10-52	10-28
0 7	Central Station Railway bridge ..	64-00	9-35	Iron girder bridge	9-35	9-35
1 4½	General Hospital bridge ..	49-00	11-04	Masonry segmental arch ..	10-62	10-38
1 6	South Indian Railway bridge ..	13-91	7-03	Wooden bridge	7-03	7-03
2 3	Saint Mary's bridge	29-00	11-49	Do. metalled	11-49	11-49
2 3	Government House bridge ..	32-00	10-40	Masonry segmental arch ..	9-74	9-53
3 0	Marine Villa	19-83	10-92	Iron piles rough stone abutments.	10-92	10-92
3 2	Chepauk bridge	19-62	10-92	Masonry segmental arch ..	9-92	9-17
3 6	Pycroft's road bridge	19-62	11-29	Do. do.	10-29	9-54
3 7½	Soorkarammah Street bridge ..	20-17	11-52	Masonry and wooden platform.	11-52	11-52
4 2	Ica House road	19-83	11-68	Masonry segmental arch ..	10-68	9-93
4 6½	Elliott's road	20-17	11-77	Masonry semicircular arch ..	10-44	9-35
5 0	Barber's bridge	27-33	9-71	Masonry and wooden platform.	9-71	9-71
5 3½	Moondacunny Covil road bridge ..	20-00	13-22	Do. do.	13-22	13-22
5 5	Cutcherry road	19-58	10-42	Masonry semicircular arch ..	9-09	8-00
5 5½	Brodie's road bridge	20-17	10-89	Do. do.	9-68	8-77
6 3	Poonthotum aqueduct	20-42	10-05	Masonry wooden platform ..	10-05	10-05
6 3	Yellapatha Mauda Covil road ..	20-25	9-22	Do. do.	9-22	9-22
7 1½	Soolay Cauthoy Syphon	21-83	10-00	Do. do.	10-00	10-00
8 0	Greenaway's bridge	21-00	13-03	Masonry segmental arch, skew ..	12-03	11-03
8 0	Guindy bridge, span excluding tow paths.	45-00	15-42	Masonry elliptical arch ..	15-17	15-09
10 0	Lattice bridge do. do. ..	43-00	12-14	Masonry abutments and wooden structure.	12-14	12-14
42 0	Sadrus bridge do. do. ..	43-75	13-83	Masonry elliptical arch ..	13-58	13-50
45 0	Ismalpett bridge do. do. ..	35-00	14-75	Masonry semicircular arch ..	14-38	14-13

** The figures in antique show the Bridges having the least headway.

5. Paragraph 7.—Observations concurred in.
6. Paragraph 8.—A flood-gate which would form no impediment to traffic would answer all purposes.
7. The sewage of all the north portion of Black Town should unquestionably be diverted from discharging into the canal by an intercepting sewer, to be constructed by the Municipality.
8. Paragraph 9.—Agreed.
9. Paragraph 10.—Approved, but the question will require further study. Some of the present lime kilns which occupy the needed ground must be removed.
10. Paragraph 12.—New bridges should be provided for, but the removal of the present structures is not a matter of urgency.
11. Paragraphs 13 and 14.—This lock has not sufficient height to clear it in maximum floods, and is at least half a mile too far north. It will be necessary to remove this lock and take a new isolated channel from 6 M. 6 F. through the ground to the east as far as 9 M. 3 F. where there should be a flood-gate. By these arrangements the canal will be preserved from the effects of the floods of the Kortalayár and of the Red Hill tank drainage, from both of which it now suffers greatly at times.
12. Paragraph 15.—From 11½ to 20½ M. should be taken in a new isolated channel east of the backwater, with flood-gates at either end. The existing deep portion of canal between 17 M. and 19 M. might be included in this new line. Owing to the oozy nature of the bottom in the existing backwater, dredging would have no permanent effect.
13. The opening into the Chintamony backwater will have in any case to be left open for the free passage of flood water. From immediately beyond this point, and to the entrance of the lake beyond the town of Pulicat, careful study is required. So far as can

be judged, however, a feasible plan would seem to consist in making an isolated channel 4½ miles in length along the west margin of the backwater, between 20½ M. and 25 M., with flood-gates at either end.

14. I do not approve of the proposal to bank across the opening at 20½ M., nor to take the canal along the east margin close up to the bar; this would certainly be dangerous for boats during flood.

15. Paragraph 17.—The only apparent means for ensuring a sufficiently protected line along all this portion will be to take a new isolated line, as proposed, along the depression which commences a little north of the Pulicat bar. Some palliatives are feasible, e.g., altering slightly the end of the south cut in the lake so as to carry it into deep water, but there is no radical cure apparently for the admitted difficulties of the present line, which is throughout exposed to the wide expanse of water on the west.

16. The only part of the line which can be considered as adequately protected between Pulicat and Cusbah is the short portion between 35 M. 7 F. and 38 M., and this of course can be taken into the new line.

17. From a peculiarity in the conformation of the Pulicat lake, it appears that, when the waters of excessive floods begin to subside, the canal from a little north of 36 M. acts as a surplus channel. A very beneficial scour is thus found to have been set up throughout the line to its southern debouchure in the lake at 27 M. This peculiarity should be turned to use for the new isolated line by the construction of a powerful head sluice in the west bank at 36 M., and a scour produced in the channel down to the bar whenever circumstances favor. A sluice with five or six openings, 6 feet wide each, would apparently suffice.

18. Whether a flood-gate would be needed at the southern extremity near the Pulicat bar is not as yet clear.

19. Paragraph 22.—From Cusbah, 45 M., northwards a strong west bank, well above flood level, is essential, and the canal should be isolated up to 68 M., where a flood-gate may be placed. An interval will here have to be left for the passage of flood water, and the new cut to the west of the backwater, as suggested by Major Vibart, made up to Dugarápatnam, 69 M. This short portion will also need to be isolated by flood-gates at either end. The proposed basin at Dugarápatnam should, as elsewhere, consist of a simple widening of the channel.

20. Paragraph 24.—If on further inquiry the drainage which enters at 71 M. 5 F. cannot safely be barred from entering the canal, a flood-gate must be placed a little north. I do not consider a sluice weir, as proposed here, to be suitable. Another flood-gate will be needed a little south of the Swarnamukhi river. This reach of canal, 4 miles in length, will thus, with the embankments proposed, be thoroughly isolated in case of flood.

21. Paragraph 25.—The crossing of the Swarnamukhi river is a complicated matter, and calls for further examination. So far as can be judged, Major Vibart's proposed deviation from a point near the village of Govindapulli to Mullapulli, combined with training the river by means of embankments and strongly constructed cross bunds east and west, appears to hold out the best solution.

22. Paragraph 27.—No remark called for further than that at either extremity of these 14 miles of canal flood-gates might with advantage be placed. It does not appear essential to make so long a deviation, (1 mile in length,) as proposed here by Major Vibart. If the present end of the channel as it enters the Kundalairoo river is turned east and north for about 2 furlongs, and made to enter the backwater close to the west of the Gungapalliem village, it will answer all purposes, as the backwater is believed to remain permanently deep at this point.

23. Paragraph 30.—The Kistnapatam basin must be extended as proposed. A flood-gate will be required south of the basin, and as regards the canal to the north, the banks must be raised and the channel isolated.

24. Paragraph 31.—At Nellatoor it will be necessary to cut a fresh channel for nearly two miles (95 M. 4 F. to 97 M. 6 F.,) a little east of the present line in rather higher ground, thus leaving the present channel free for the passage of drainage.

25. *Paragraph 32.*—The whole of the drainage here must be collected and passed across the channel at one point.

26. *Paragraph 33.*—Here again, of the three openings the central one must be kept clear for the passage of the drainage, closing the others.

27. *Paragraph 34.*—The Pennér river (114 M. 3 F. to 116 M. 6 F.) crossing is probably the most difficult matter to deal with in the length of the canal. Some Rs. 11,000 were spent in taking the silt out of the cut here (115 M. 4 F. and 116 M. 3 F.) within the first year of opening the canal, and in both the cyclones of 1879 not only has the same cut again silted up to within 9 inches of L.W.L., but the several branches of the river, five in number, show such a tendency to change their course that it has become a serious matter for consideration as to how the canal can here be kept open for traffic. Even were steam-dredges available, the canal would still be closed after each ordinary fresh in the river to all but top-boats and others of very light draft taking advantage of high tide, and the stoppage would be absolute after a cyclone flood of any intensity. No mere palliatives will therefore answer here, and my conviction is that the best and, in the end, by far the most economical course will be to train the Pennér in such a way from the head of its delta that the discharge shall take place entirely through its southernmost channel, closing all the others. This can be done by training the river from a point near the village of Utakoor, about three miles west of the canal, on the left bank. At the same time, groynes should be so constructed on the right bank, a little north of Kuddipalem, that the present line of river bank and the flood embankment within it shall be preserved from invasion. The left embankment would probably extend from Utakoor to the destroyed village of Palipalem. By this means not only would a sufficiently deep channel be always preserved in the southern branch of the river, but by closing the canal ends north and south with flood-gates, these would be preserved from the silting which now causes the difficulty. I do not consider that there should be any serious difficulty in training the Pennér as proposed, but further careful study of all the features is necessary.

28. *Paragraphs 37 and 38.*—Banking across the Ramatheertham drainage is inadmissible; it will be essential to cut a new line, of about six furlongs in length, to the west of the present line, so as to avoid getting dangerously close to the bar.

29. *Paragraphs 39 and 40.*—As with the Ramatheertham so with the Pydaru (123 M. 6 F.) and the Eskapally (126 M.) drainages, free vent must be allowed across the line of canal, but a strong west bank, to keep out floods should be constructed. Whether it will be necessary eventually to isolate each of these portions with flood-gates (that at 117 M. is essential) cannot however be decided with certainty.

30. *Paragraph 42.*—The plan suggested of training the river so as to occupy and deepen out its central channel, and further to make a new cut to the west, of about two miles long, through ground 3 or 4 feet above M.S.L., seem essential. Since the cyclone of May 1879 the existing channel through the backwater has changed no less than four times.

31. Flood-gates will be required, one north of the Chippelairoo, at probably 134 M. and another at the 148 M. 2 F.

32. *Paragraph 46.*—The Ramapatam drainage, which enters at 148 M. 3 F. might have its outlet to the sea barred permanently, and the drainage thus taken into the canal utilised with a view to bringing a beneficial scour to bear on the northern portion towards the Elikeru.

33. *Paragraph 47.*—As regards this drainage it will be best to embank across the northern outlet, placing a flood-gate at 151 M. leaving the present southern opening (150 M. 6 F. to 150 M. 7 F.) free to discharge by the open bar.

34. To prevent the silting of the channel south of the Manneru, a flood-gate will be necessary at about 160 M.

35. The spill of the Manneru floods over the left bank of the river must be stopped by an embankment, but the most essential work here, and one which there should be no delay in carrying out, is the deviation of the present channel for about three furlongs in length, as suggested by Major Vibart. Without any cyclone flood in 1878 some three miles of channel here silted up to a depth of over 2 feet with ordinary

freshets, and there can be no question that flood-gates are essential at both the Manneru and Palar ends of this reach of the canal.

36. *Paragraphs 49 and 50.*—Agreed. It is essential that the spill of the Palaru floods over its right bank should be barred by a strong embankment from the north end of the present Pakala bank as far as the canal.

37. *Paragraph 51.*—The short portion of canal, six furlongs in length, between the Moosee and Palar rivers, having silted up in both the May and November cyclones of 1879, barring navigation, some early and effective means must be found for curing the present defects.

38. Hand-dredging alone has not sufficed to allow of a passage being opened for any but boats of very light draft at high tide within two months after the last flood, and even then cargo boats drawing over 1' 9" have had to unload and have the goods carried by hand three-quarters of a mile. For a short time after the November cyclone there was a passage to the east, close to the united bars of the two rivers, but this did not last long. Had powerful steam-dredges been available, and at once set to work, a passage might no doubt have been opened at an earlier date, but at the best it may be assumed that, subsequent to each of the cyclones of last year, this portion of the canal must have been closed to traffic for five or six weeks; it is thus clear that exceptional measures are called for to prevent as far as possible the recurrence of such delays, which if allowed to continue must affect very injuriously the traffic on the canal. Were it feasible to divert one or other river, so as to discharge both streams by a single channel into the sea, the difficulty now experienced would vanish, but as this means cannot I consider be adopted, it appears that the most effective and economical plan will be to excavate a second channel parallel to, and a little west of, the present cut, six furlongs long. This channel, measuring 15 feet in breadth at bottom and carried to 2½ feet below M.S.L., should be excavated as soon as possible. When opened to traffic the existing channel should be closed, cleared and deepened, opened for traffic, and the new subsidiary canal closed by temporary banks and prepared to receive the traffic after the next flood. By thus working alternately on two channels alongside of each other a feasible palliative for the existing difficulties will at least be provided. No west bank will be needed for the new channel, all spoil going to form a high strong bank for the existing cut so as to insure its isolation. Flood-gates at each extremity of the latter will also be needed, if not indeed for both channels.

39. *Paragraph 57.*—The preservation and management of the stretch of canal from one mile north of the Moosee bar (about 170 M.) to the Gundlakamma river depends on the treatment of the spill of the former river during flood over its left bank. Whether it be feasible to train the river by means of a left embankment, starting from a point near the village of Tirupu Nayadipalum, and thus force the whole floods through the present bar, is not clear, but the subject should receive attention.

40. For the present, immediate relief will be given by cutting away entirely the banks which were injudiciously thrown across the Tondairoo creek at 177 M. 2 F. and again at 177 M. 6 F. The effect of any further flood will be to bring a beneficial scour to bear on the whole length of the channel northward, towards the Gundlakamma.

41. Should, however, the training bank for the left bank of the Moosee river as suggested prove feasible, it would in that case probably be desirable to cut a fresh channel for the canal in the four furlongs a little to the east, so as to keep clear of the Tondairoo creek as proposed by Major Vibart. There should be a flood-gate at the end of the canal as it enters the Moosee river.

42. *Paragraphs 57 and 58.*—The basin at Kottapatam may, as suggested, consist of nothing more than an enlargement of the channel to the east and north of the present bridge. This latter, though shaken by the November cyclone, is now sufficiently secure to last with repairs for some years, and though boats in passing it have to lower their masts, there is no serious inconvenience, as they invariably halt at the place.

43. The road dam immediately west of the bridge must be removed (as being much too close to the canal) to a point on the Ongole road 300 yards further west; and be

there reconstructed 100 yards in length, lowest point of invert being 1 foot above H.W.L. The materials of the present dam will nearly suffice for the new, and the same style of tail apron should be employed. The western embankment of the canal (south of the bridge) should be much strengthened, and the road well raised over the site of the present dam, so as effectually to prevent any future invasion by flood water. The laterite bridge, which with its nine elliptical arches of 18 feet span carries off all the residue of the Tondairoo drainage not vented by the canal, should be thoroughly repaired as its flooring is still sound. The unworkman-like additions made on either side of the arches to bear the parapets, and which were much injured by the November flood, must be removed and the roadway reduced to about $9\frac{1}{2}$ feet in width. The removal and reconstruction of the road dam above adverted to must be charged to the canal, but the alterations of the bridge ought to devolve on the Local Fund Board, who may also fairly undertake the construction of the proposed Moosafirkhana at Utapotu.

44. Paragraphs 59, 60, 61.—Northward from Kottapatnam (179 to 187 M.) the banks originally low have suffered severely during the November cyclone, first by the action of the storm wave from the east, there being no protecting "dunes" here, and second, from the land flood which supervened. But notwithstanding this destruction of the banks the channel has been, if any thing, improved owing to the fact that the surplus of the Moosee river flood vented itself through the Tondairoo creek, and finding its way into the canal scoured it throughout and cleared it of silt. Practically, therefore, little work is required in this reach. In a few places a strong, well planted, east bank will be needed to counteract the action of a storm wave; but on the west the less obstruction presented to the land flood the better, unless at some future time the expense of a sufficiently high and strong isolating west bank be considered essential. As matters stand, levelling down the bank as much as possible and bringing the tow-path into order is all that need be thought of. No vegetation seems to thrive here owing to the salt dust carried by the west winds which smothers and kills even the "woolsa" rush and the salt plant "eela," both of which thrive elsewhere. So long as the channel is not isolated no flood-gate is necessary at the Gundlakamma.

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48. Paragraphs 66, 67, 68.—Little remark called for. It may be doubted whether the position of the new lock at Feringy Dibba has been judiciously selected, and whether, looking to the great drainage which sweeps over the whole country south of Santaravoor, it would not have been safer to have given another flight to this latter lock, and dropped the canal thus direct into the Rompairoo drainage. It is now however too late to suggest any alteration of the arrangements here.

49. Paragraph 69.—The reasoning here employed by Major Vibart in favor of isolating the different reaches of the canal which intervene between drainages that cannot safely, particularly during flood, be barred in the passage to the sea, derives additional force from the effects of the November cyclone which followed on the

there reconstructed 100 yards in length, lowest point of invert being 1 foot above H.W.L. The materials of the present dam will nearly suffice for the new, and the same style of tail apron should be employed. The western embankment of the canal (south of the bridge) should be much strengthened, and the road well raised over the site of the present dam, so as effectually to prevent any future invasion by flood water. The laterite bridge, which with its nine elliptical arches of 18 feet span carries off all the residue of the Tondairoo drainage not vented by the canal, should be thoroughly repaired as its flooring is still sound. The unworkman-like additions made on either side of the arches to bear the parapets, and which were much injured by the November flood, must be removed and the roadway reduced to about $9\frac{1}{2}$ feet in width. The removal and reconstruction of the road dam above adverted to must be charged to the canal, but the alterations of the bridge ought to devolve on the Local Fund Board, who may also fairly undertake the construction of the proposed Moosafirkhana at Utapotu.

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Imperial.
of — in the Accounts of Executive Officers
for the month of November 1879 under

Objectionable Items.—Orders on Statement

FEBRUARY.

G. O., 7th February 1880, No. 295 W.

Recd. Encl.

Issued

Dated February 7th.

Ac. Rec. Ac.

THE SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES.

To

PUBLIC WORKS.

Govt. of (1880) STRAITS.

GENERAL
ACCOUNT.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General.
Account.

Read the following paper :—

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
1	WITHOUT ESTIMATE. Buckingham Canal. Opening Ennore bar including groyne work.	5	July 1879 ..	..	4,285	4,285	..	8 This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
2	Presidency. Petty repairs carried out by Barrack Master, Presidency.	6	June ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. <i>Vide</i> paragraph 2 of G.O., No. 3,297 W., dated 22nd December 1879.
3	Rejismundry. Erecting cooking sheds at Rejismundry.	2	Oct. "	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectable Items for November 1879. A reference has therefore been made to him on the subject.	3. <i>Vide</i> paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rejismundry and Ellore.	2	Oct. "	..	295	295	..		
	Total ..	..	..	..	6,280	6,280	..		

PART I.—Irregularities with respect to Estimate up to the month of November 1879—cont.

Item Number.	Particulars.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
<i>Bangalore.</i>									
5	General repairs to buildings in Parade barracks.	1	Nov. 1879 ..	1,420	1,750	330	1,750	The Executive Engineer reports in his Statement of Objectable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	<i>North Arcot.</i>	1	" "	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Repairing and refitting the flag staff in the Vellore Fort.								
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
<i>Works above Rs. 2,500.</i>								
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	5,000	5,000	Completed in October 1879.	6. <i>Vide</i> Chief Engineer's memorandum No. 3,736, dated 8th December 1879.
Guntur	Making a road from trunk road near Kávali to Salt platform.	1	Nov. " ..	1	..	14,972	<i>Vide</i> G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General.
Account.

Read the following paper :—

IMPERIAL, BUILDINGS AND ROADS.

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.									
<i>Buckingham Canal.</i>									
1	Opening Ennore bar including groyne work.	5	July 1879 ..	..	4,285	4,285	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
<i>Presidency.</i>									
2	Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. <i>Vide</i> paragraph 2 of G.O., No. 3,297 W., dated 22nd December 1879.
<i>Rajahmundry.</i>									
3	Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectable Items for November 1879. A reference has therefore been made to him on the subject.	3. <i>Vide</i> paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajahmundry and Ellora.	2	Oct. " ..	..	295	295	295		
	Total ..	..	..	..	6,280	6,280	..		

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate	Expenditure up to Date.	Excess over Estimate	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
<i>Bengalore.</i>									
6	General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	1,420	1,750	330	1,750	The Executive Engineer reports in his Statement of Objectionable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	<i>North Arcot.</i>	1	" "	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectionable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	5,000	5,000	Completed in October 1879.	
Guntūr	Making a road from trunk road near Kávali to Salt platform.	1	Nov. " ..	1	..	14,972	<i>Vide</i> G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. <i>Vide</i> Chief Engineer's memorandum No. 3,735, dated 8th December 1879.

Tinnevely ..	Works below Rs. 2,500.	..	..	1	745	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.
Ganjam ..	.....	..	..	1	810	800		
Chingleput ..	.....	..	..	12	1,036	1,116		
Rajahmundry ..	.....	..	..	1	158	156		
Presidency ..		..	..	5	2,795	2,835		

(True Extract.)

Ag. Under Secy. to Govt., P.W.D.
Major, R.E.,

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
Revenue Department.
" Superintendent of Works, Buckingham Canal.
" Examiner of Public Works Accounts."

GENERAL.
ACCOUNT.

Govt. of (1880) Madras.
PUBLIC WORKS.

To

THE SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,

&c., &c., &c.

Dated February 7th.

Issued

Recd.

Encl.

G. O., 7th February, 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statement
of — in the Accounts of Executive Officers
for the month of November 1879 under
Imperial.

PUBLIC WORKS DEPARTMENT, 7TH FEBRUARY 1880, No. 295 W.

3

	744	745	1		Works below Rs. 2,500.	
Government are particularly re- quested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	800	810	1		.....	Tinnevely
	1,116	1,036	12		.....	Ganjam
	156	158	1		.....	Chingleput
	2,833	2,795	5		.....	Rajahmundry
					.....	Presidency

requiring the more punc-
tual submission of these
documents.

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

(True Extract.)

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
" Revenue Department.
" Superintendent of Works, Buckingham Canal.
" Examiner of Public Works Accounts.

Exd. S. T. Austin.
Spare Copies

Gobt. of (1880) Madras.
PUBLIC WORKS.

To
THE SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,
&c., &c., &c.

Dated February 7th.

Issued

Recd.

Encl.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statement of — in the Accounts of Executive Officers for the month of November 1879 under Imperial.

Objectionable Items.—Orders on Statement of — in the Accounts of Executive Officers for the month of November 1879 under Imperial.

FEBRUARY.

G. O., 7th February 1880, No. 295 W.

Encl.

Recd.

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Dated February 7th.

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THE SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCUITS,

PUBLIC WORKS.

Govt. of 1880) 10 1900.

GENERAL ACCOUNT.

[illegible]

PART I.—Irregularities with respect to Estimate up to the month of November 1879—*cont.*

Item Number.	Particulars.	Number of Accounts in which Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate	Expenditure up to Date.	Excess over Estimate	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
5	<i>Bangalore.</i> General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,750	Rs. 330	Rs. 1,750	The Executive Engineer reports in his Statement of Objectable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	<i>North Arcot.</i> Repairing and retelling the flag staff in the Vellore Fort.	1	" "	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Accounts in which Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
<i>Works above Rs. 2,500.</i>								
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	Rs. 6,000	5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near K&vali to Salt platform.	1	Nov. " ..	1	..	14,972	Vide G.O., No. 3,295 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. Vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879,

Timevelly ..	Works below Rs. 2,500.	1	745	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.
Ganjem ..	..	1	810	800		
Chingleput ..	..	12	1,036	1,116		
Rajahmundry ..	..	5	158	156		
Presidency ..	..	..	2,795	2,835		

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles:
 " Revenue Department.
 " Superintendent of Works, Buckingham Canal.
 " Examiner of Public Works Accounts.

Exd. S. T. Austin.
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Objectionable Items.—Orders on Statement of — in the Accounts of Executive Officers for the month of November 1879 under Imperial.

FEBRUARY.

G. O., 7th February 1880, No. 295 W.

Recd. Issued
Encl.

Dated February 7th.

To
The SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,
&c., &c., &c.

Govt. of Madras.
PUBLIC WORKS.

GENERAL
ACCOUNT.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General
Account.

Read the following paper:—

IMPERIAL, BUILDINGS AND ROADS.

Part I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate	Expenditure up to Date.	Excess over Estimate	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.									
1	Buckingham Canal. Opening Ennore bar including Eroyno work.	5	July 1879 ..	..	4,285	4,285	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer. 2. <i>Vide</i> paragraph 2 of G.O., No 3,297 W., dated 22nd December 1879. 3. <i>Vide</i> paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.
2	Presidency. Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	
3	Rajahmundry. Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.	
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. " ..	..	295	295	..		
Total ..		..	..	..	6,280	6,280	..		

Proceeding of the Madras Govt. Revenue Department.
Read the following:

Part I.—Irregularities with respect to Estimate up to the month of November 1879—cont.

Item Number.	Particulars.	Number of Accounts in which Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
5	<i>Bangalore.</i> General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,750	330	1,750	The Executive Engineer reports in his Statement of Objectable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	<i>North Arcot.</i> Repairing and retitting the flag staff in the Vellore Fort.	1	" ..	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O. No. 879 W. of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Accounts in which Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	Rs. 5,000	5,000	Completed in October 1879.	
Gunbdr	Making a road from trunk road near Kaval to Salt platform.	1	Nov. " ..	1	..	14,972	Vide G.O. No. 3,297 W. of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. Vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879.

Tinnevely ..	Works below Rs. 2,500.	..	..	1	745	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.
Ganjem ..	..	..	..	1	810	800		
Chingleput ..	..	..	..	12	1,086	1,116		
Rajamahendry ..	..	..	..	1	138	156		
Presidency ..	..	..	..	3	2,795	2,835		

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
" Revenue Department.
" Superintendent of Works, Buckingham Canal.
" Examiner of Public Works Accounts.

Exd. S. T. Austin.
Spare Copies

GENERAL
ACCOUNT.

Govt. of Madras.
PUBLIC WORKS.

To
THE SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,
&c.,
&c.,
&c.

Dated February 7th.

Issued

Recd.

Encl.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statement
of — in the Accounts of Executive Officers
for the month of November 1879 under
Imperial.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General
Account.

Read the following paper:—

IMPERIAL, BUILDINGS AND ROADS.

Part I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Accounts in which Objec- tionable Items.	Month in the Accounts of which Objec- tionable Expenditure first appeared.	Rs.	Rs.	Rs.	Expendi- ture up to Date.	Excess over Estimate	Expendi- ture during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.											
1	Buckingham Canal, Opening Ennore bar includ- ing groynes work.	6	July 1879 ..	..	4,285	4,285	..	..	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W.
2	Presidency, Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	..	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 6th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
3	Rajahmundry, Erecting cooking sheds at Rajahmundry	2	Oct. " ..	..	200	200	..	..	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has there- fore been made to him on the subject.	3. Vide paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajah- mundry and Ellore.	2	Oct. " ..	..	295	295	..	..	..		
Total ..		..	..	..	6,280	6,380	..	..	..		

Item Number.	Particulars.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate	Expenditure up to Date.	Excess over Estimate	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
5	EXCESS OVER ESTIMATE. <i>Bangalore.</i> General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,750	Rs. 330	Rs. 1,750	The Executive Engineer reports in his Statement of Objectable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	<i>North Arcot.</i> Repairing and refitting the flag staff in the Vellore Fort.	1	" ..	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Division.	Name of Work.	Number of Appearances in Statements of Objective Items.	Month in the Accounts of which Objective Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
	COMPLETION REPORTS NOT SUBMITTED TO EXAMINER. <i>Worth above Rs. 2,500.</i>				Rs.	Rs.		
Presidency	Maintenance of annual repairs to Esplanade road.	2	Oct. 1879	1	5,000	5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near Kéavali to Salt platform.	1	Nov. "	1	"	14,972	<i>Vide G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.</i>	6. <i>Vide</i> Chief Engineer's memorandum No. 3,735 dated 8th December 1879.

[illegible]

Exd. S. T. Austin.
Spare Copies

GENERAL
ACCOUNT.

Govt. of Madras
PUBLIC WORKS.

The SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,

Ac.,
Ac.,
Ac.

Dated February 7th.

Issued

Recd.

Encl.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statement
of — in the Accounts of Executive Officers
for the month of November 1879 under
Imperial.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General
Account.

Read the following paper:—

IMPERIAL, BUILDINGS AND ROADS.

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appear- ances in Statements of Objec- tionable Items.	Month in the Accounts of which Objec- tionable Expenditure first appeared.	Rs. Amount of Estimate	Rs. Expendi- ture up to Date.	Rs. Excess over Estimate	Rs. Expendi- ture during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
1	WITHOUT ESTIMATE. <i>Buckingham Canal.</i> Opening Ennore bar includ- ing groynes work.	5	July 1879 ..	..	4,285	4,285	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
2	<i>Presidency.</i> Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. <i>Vide</i> paragraph 2 of G.O., No 3,297 W., dated 22nd December 1879.
3	<i>Rajahmundry.</i> Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has there- fore been made to him on the subject.	3. <i>Vide</i> paragraph 6 of G.O., No, 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajah- mundry and Ellore.	2	Oct. " ..	..	295	295	..		
Total ..		..	..	..	6,280	6,280	..		

Part I.—Irregularities with respect to Estimate up to the month of November 1879—*cont.*

Item Number.	Particulars.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
6	Bengalore. General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,750	Rs. 330	Rs. 1,750	The Executive Engineer reports in his Statement of Objectable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	North Arcot. Repairing and refitting the flag staff in the Vellore Fort.	1	" ..	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
Presidency	Maintenance of annual repairs to Explorade roads.	2	Oct. 1879 ..	1	Rs. 5,000	Rs. 5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near Kárai to Salt platform.	1	Nov. "	1	..	14,972	Vide G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. Vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879,

Tinnevely ..	..	..	..	1	743	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.
Chingleput ..	..	..	..	12	810	800		
Rajahmundry ..	..	..	..	1	1,036	1,116		
Presidency ..	..	..	..	3	158	156		
					2,793	2,833		

Works below Rs. 2,500.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
" Revenue Department.
" Superintendent of Works, Buckingham Canal.
" Examiner of Public Works Accounts.

Exd. S. T. Austin.
Spare Copies

General Account.
 Govt. of (1880) Madras.
 PUBLIC WORKS.
 To
 THE SUPERINTENDING ENGINEERS,
 FIRST, SECOND, THIRD, AND
 FIFTH CIRCLES,
 &c., &c., &c.
 Dated February 7th.
 Issued
 Recd.
 G. O., 7th February 1880, No. 295 W.
 FEBRUARY.
 of — in the Accounts of Executive Officers
 for the month of November 1879 under
 Imperial.

Read the following paper:—

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

IMPERIAL, BUILDINGS AND ROADS.

General
 Account.

7th February 1880, No. 295 W.

PUBLIC WORKS DEPARTMENT.

GOVERNMENT OF MADRAS.

Item Number.	Particulars.	Number of Appear- ances in Statements of Objec- tionable Items.	Month in the Accounts of which Objec- tionable Expenditure first appeared.	Amount of Estimate	Expendi- ture up to Date.	Excess over Estimate	Expendi- ture during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.									
1	<i>Buckingham Canal.</i> Opening Ennore bar includ- ing groynes work.	5	July 1879 ..	..	4,285	4,285	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
2	<i>Presidency.</i> Petty repairs carried out by Barrack Master, Presidency.	6	June ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. Vide paragraph 2 of G.O., No 3,297 W., dated 22nd December 1879.
3	<i>Rajahmundry.</i> Erecting cooking sheds at Rajahmundry.	2	Oct. ..	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has there- fore been made to him on the subject..	3. Vide paragraph 6 of G.O., No, 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajah- mundry and Ellore.	2	Oct. ..	..	295	295	..		
Total ..		..	..	..	6,280	6,280	..		

Part I.—Irregularities with respect to Estimate up to the month of November 1879—*cont.*

Item Number.	Particulars.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
5	<i>Bengalore.</i> General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,750	Rs. 330	Rs. 1,750	The Executive Engineer reports in his Statement of Objectable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	<i>North Arcot.</i> Repairing and refitting the flag staff in the Vellore Fort.	1	" ..	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
Presidency	<i>Works above Rs. 2,500.</i> Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	Rs. 5,000	5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near K&vali to Salt platform.	1	Nov. " ..	1	..	14,972	<i>Vide</i> G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. <i>Vide</i> Chief Engineer's memorandum No. 3,735, dated 8th December 1879,

Tinnevely ..	Works below Rs. 2,500.	..	..	1	745	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.
Ganjam ..	..	..	..	1	810	800		
Chingleput ..	..	..	..	12	1,036	1,116		
Kajahmundry ..	..	..	..	1	158	156		
Presidency ..	..	..	..	5	2,795	2,835		

(True Extract.)

(Signed) R. II. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
" Revenue Department.
" Superintendent of Works, Buckingham Canal.
" Examiner of Public Works Accounts.

Exd. S. T. Austin.
Spare Copies

GENERAL
ACCOUNT.

Govt. of Madras.
PUBLIC WORKS.

To
THE SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,
&c.,
&c.,
&c.

Dated February 7th.

Issued
Recd.

Encl.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statement
of — in the Accounts of Executive Officers
for the month of November 1879 under
Imperial.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General
Account.

Read the following paper:—

IMPERIAL, BUILDINGS AND ROADS.

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appear- ances in Statements of Objec- tionable Items.	Month in the Accounts of which Objec- tionable Expenditure first appeared.	Rs.	Rs.	Rs.	Rs.	Expendi- ture during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
1	WITHOUT ESTIMATE. Buckingham Canal. Opening Ennore bar includ- ing groynes work.	5	July 1879 ..	..	4,285	4,285	..	8	This office has nothing to add to the remarks made in the statement for October 1879.	It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
2	Presidency. Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. Vide paragraph 2 of G.O., No 3,297 W., dated 22nd December 1879.
3	Rajahmundry. Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	..	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has there- fore been made to him on the subject.	3. Vide paragraph 6 of G.O., No, 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajah- mundry and Ellore.	2	Oct. " ..	..	295	295	..	..		
Total ..		..	..	..	6,280	6,280	..	..		

Part I.—Irregularities with respect to Estimate up to the month of November 1879—cont.

Item Number.	Particulars.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate	Expenditure up to Date.	Excess over Estimate	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
5	<i>Bangalore.</i> General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,750	Rs. 330	Rs. 1,750	The Executive Engineer reports in his Statement of Objectable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	<i>North Arcot.</i> Repairing and refitting the flag staff in the Vellore Fort.	1	" ..	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
Presidency ..	Maintenance of annual repairs to Esplanade roads. <i>Works above Rs. 2,500.</i>	2	Oct. 1879 ..	1	Rs. 5,000	Rs. 5,000	Completed in October 1879.	
Gunter ..	Making a road from trunk road near Kaval to Salt platform.	1	Nov. " ..	1	..	14,972	<i>Vide</i> G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. <i>Vide</i> Chief Engineer's memorandum No. 3,735, dated 8th December 1879,

Timnevelly	..	..	..	1	745	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.	
Ganjam	..	..	..	1	810	800			
Chingleput	..	..	..	12	1,036	1,116			
Rajahmundry	..	..	..	1	158	156			
Presidency	..	..	..	5	2,795	2,835			
Works below Rs. 2,500.									

(True Extract.)

(Signed) R. H. SANKER, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
" Revenue Department.
" Superintendent of Works, Buckingham Canal.
" Examiner of Public Works Accounts.

Exd. S. T. Austin.
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GENERAL ACCOUNT.

Govt. of Madras.
PUBLIC WORKS.

To
The SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,
&c., &c., &c.

Dated February 7th.

Issued
Recd.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statement of — in the Accounts of Executive Officers for the month of November 1879 under Imperial.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

Read the following paper:—

IMPERIAL, BUILDINGS AND ROADS.
PART I.—Irregularities with respect to Estimate up to the month of November 1879.

General.
Account.

Item Number.	Particulars.	Number of Appear- ances in Statements of Objec- tionable Items.	Month in the Accounts of which Objec- tionable Expen- diture first appeared.	Rs. Amount of Estimate	Rs. Expendi- ture up to Date.	Rs. Excess over Estimate	Rs. Expendi- ture during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
1	WITHOUT ESTIMATE. <i>Buckingham Canal.</i> Opening Ennore bar includ- ing groyne work.	5	July 1879 ..	..	4,285	4,285	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for 1879. The Commissioner on the 6th December to expedite its return to the proper Public Works Officer.
2	<i>Presidency.</i> Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. <i>Vide</i> paragraph 2 of G.O., No 3,297 W., dated 22nd December 1879.
3	<i>Rajahmundry.</i> Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has there- fore been made to him on the subject.	3. <i>Vide</i> paragraph 6 of G.O., No, 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajah- mundry and Ellore.	2	Oct. " ..	..	295	295	..		
Total ..	..	..	..	..	6,280	6,280	..		

Part I.—Irregularities with respect to Estimate up to the month of November 1879—*cont.*

Item Number.	Particulars.	Number of Accounts in Statements of Objectable Items.	Month in the Accounts of which Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
6	<i>Bangalore.</i> General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	RS. 1,420	RS. 1,760	RS. 330	RS. 1,760	The Executive Engineer reports in his Statement of Objectable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expeditious.
	<i>North Arcot.</i> Repairing and refitting the flag staff in the Vellore Fort.	1	" "	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O. No. 879 W. of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appear- ances in Statements of Objec- tionable Items.	Month in the Accounts of which Objec- tionable Expen- diture first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Govern- ment.
	COMPLETION REPORTS NOT SUBMITTED TO EXAMINER. <i>Works above Rs. 2,500.</i>	2	Oct. 1879	1	Rs. 5,000	5,000	Completed in October 1879.	
Presidency	Maintenance of annual repairs to Esplanade roads.	1	Nov. "	1	..	14,972	<i>Vide</i> G.O. No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. <i>Vide</i> Chief Engineer's memorandum No. 3,735, dated 8th December 1879,
Guntur.	Making a road from trunk road near Kárali to platform.							

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Works below Rs. 2,500.	1	1	12	1	3	745	810	1,036	158	2,195	744	800	1,116	156	2,835	Government are particularly re-	quiring the more punc-	tual submission of these	documents.																																																																																	

(Signed) **R. H. SANKEY, Colonel, R.E.,**
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
 Revenue Department.
 Superintendent of Works, Buckingham Canal.
 Examiner of Public Works Accounts.

Exd. S. T. Austin.
Spare Copies .

GENERAL ACCOUNT.

Govt. of Madras.

PUBLIC WORKS.

To
The SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,
&c., &c., &c.

Dated February 7th.

Issued
Recd.

Fuel.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statement of — in the Accounts of Executive Officers for the month of November 1879 under Imperial.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General Account.

Read the following paper:—

IMPERIAL, BUILDINGS AND ROADS.
Part I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Accounts in which Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate	Expenditure up to Date.	Excess over Estimate	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.									
1	Buckingham Canal. Opening Ennore bar including groynes work.	6	July 1879 ..	Rs. ..	Rs. 4,285	Rs. 4,285	Rs. 8	This office has nothing to add to the remarks made in the statement for October 1879.	It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 6th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer. 2. <i>Vide</i> paragraph 2 of G.O., No 3,297 W., dated 22nd December 1879. 3. <i>Vide</i> paragraph 6 of G.O., No, 3,297 W., dated 22nd December 1879.
2	Presidency. Petty repairs carried out by Barrack Master, Presidency.	6	June ..	Rs. ..	Rs. 1,500	Rs. 1,500	Rs. ..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	
3	Rajahmundry. Erecting cooking sheds at Rajahmundry.	2	Oct. "	Rs. ..	Rs. 200	Rs. 200	Rs. ..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.	
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. "	Rs. ..	Rs. 296	Rs. 295	Rs. ..		
Total ..		..	..	Rs. ..	Rs. 6,280	Rs. 6,380	Rs. ..		

PART I.—Irregularities with respect to Estimate up to the month of November 1879—*cont.*

Item Number.	Particulars.	Number of Appearances in Statements of Objectible Items.	Month in the Accounts of which Objectible Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
6	<i>Bangalore.</i> General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,750	Rs. 330	Rs. 1,750	The Executive Engineer reports in his Statement of Objectible Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	<i>North Arcot.</i> Repairing and refitting the flag staff in the Vellore Fort.	1	" "	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectible Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectible Items.	Month in the Accounts of which Objectible Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
	<i>Works above Rs. 2,500.</i>							
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	Rs. 5,000	5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near Kavali to Salt platform.	1	Nov. " ..	1	..	14,972	<i>Vide</i> G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. <i>Vide</i> Chief Engineer's memorandum No. 3,735, dated 8th December 1879.

Timorelly ..	..	..	..	1	745	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.
Ganjam ..	..	..	..	1	810	800		
Chingleput ..	..	..	..	12	1,036	1,116		
Rajahmundry ..	..	..	..	1	136	156		
Presidency ..	..	..	..	5	2,795	2,835		
Works below Rs. 2,500.								

(True Extract.)

(Signed) R. H. SANKER, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
 " Revenue Department.
 " Superintendent of Works, Buckingham Canal.
 " Examiner of Public Works Accounts.

Exd. S. T. Austin.
 Spare Copies

GENERAL
ACCOUNT.

Govt. of Madras.

PUBLIC WORKS.

To
The SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,
Cc., Cc., Cc.,
Cc.

Dated February 7th.

Issued
Recd.

Encl.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statement
of — in the Accounts of Executive Officers
for the month of November 1879 under
Imperial.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General
Account.

IMPERIAL, BUILDINGS AND ROADS.

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Read the following paper:—

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Rs. Amount of Estimate	Rs. Expenditure up to Date.	Rs. Excess over Estimate	Rs. Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.									
1	<i>Buckingham Canal.</i> Opening Ennore bar including Groynes work.	5	July 1879 ..	..	4,285	4,285	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 6th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer. 2. <i>Vide</i> paragraph 2 of G. O. No. 3,297 W., dated 22nd December 1879.
2	<i>Presidency.</i> Petty repairs carried out by Barrack Master, Presidency.	6	June ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S. E. 3rd, dated 16th October 1879, on the subject is awaited.	
3	<i>Rajahmundry.</i> Erecting cooking sheds at Rajahmundry.	2	Oct. ..	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.	
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. ..	..	295	295	..		
Total ..		..	..	..	6,280	6,280	..		3. <i>Vide</i> paragraph 6 of G. O. No. 3,297 W., dated 22nd December 1879.

GENERAL ACCOUNT.

Govt. of Madras.

PUBLIC WORKS.

To
The SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,
&c.,
&c.,
&c.

Dated February 7th.

Issued

Recd.

Encl.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statement of — in the Accounts of Executive Officers for the month of November 1879 under Imperial.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.
7th February 1880, No. 295 W.
General Account.

IMPERIAL, BUILDINGS AND ROADS.
Read the following paper:—
PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Orders by Local Government.				Orders by Local Government.			
ORDER THEREON 7th February 1880, No. 295 W.				ORDER THEREON 7th February 1880, No. 295 W.			
It is reported that an estimate for this work was submitted to the Salt Commissioner for 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.				It is reported that an estimate for this work was submitted to the Salt Commissioner for 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.			
2. Vide paragraph 2 of G.O., No. 3,297 W., dated 22nd December 1879.				2. Vide paragraph 2 of G.O., No. 3,297 W., dated 22nd December 1879.			
3. Vide paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.				3. Vide paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.			
The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.				The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.			
The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.				The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.			
This office has nothing to add to the remarks made in the statement for October 1879.				This office has nothing to add to the remarks made in the statement for October 1879.			
Opinion of the Superintending Engineer with Final Remarks by Examiner.				Opinion of the Superintending Engineer with Final Remarks by Examiner.			
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Expenditure during Month.	Excess over Estimate	Expenditure up to Date.	Amount of Estimate	Month in the Accounts of which Objectionable Expenditure first appeared.	Number of Appearances in Statements of Objectionable Items.	Particulars.	Item Number.
..	200	200	..	Oct. "	2	Erecting cooking sheds at Rajahmundry.	3
..	295	295	..	Oct. "	2	Erecting barracks at Rajahmundry and Ellore.	4
..	6,280	6,280	..	..	..	Total ..	..
..	1,500	1,500	..	June "	6	Petty repairs carried out by Barrack Master, Presidency.	2
..	4,285	4,285	..	July 1879 ..	5	Backingham Canal, Opening Ennore bar including groynes work.	1
..	4,285	4,285	..	..	..	WITHOUT ESTIMATE.	..

Part I.—Irregularities with respect to Estimate up to the month of November 1879—*cont.*

Item Number.	Particulars.	Number of Appearances in Statements of Objectible Items.	Month in the Accounts of which Objectible Expenditure first appeared.	Amount of Estimate	Expenditure up to Date.	Excess over Estimate	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
5	<i>Bangalore.</i> General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,750	Rs. 330	Rs. 1,750	The Executive Engineer reports in his Statement of Objectible Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	<i>North Arcot.</i> Repairing and refitting the flag staff in the Vellore Fort.	1	" ..	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectible Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectible Items.	Month in the Accounts of which Objectible Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
	<i>Works above Rs. 2,500.</i>				Rs.	Rs.		
Presidency ..	Maintenance of annual repairs to Eglamale roads.	2	Oct. 1879 ..	1	5,000	5,000	Completed in October 1879.	
Guntur ..	Making a road from trunk road near Kéraili to Salt platform.	1	Nov. " ..	1	..	14,972	<i>Vide</i> G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. <i>Vide</i> Chief Engineer's memorandum No. 3,735, dated 8th December 1879.

Tinnevely ..	..	..	..	1	745	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.
Ganjiam ..	..	..	..	1	810	800		
Chingleput ..	..	..	..	12	1,036	1,116		
Kajalmundry ..	..	..	..	1	138	158		
Presidency ..	..	..	..	5	2,793	2,835		

Works below Rs. 2,500.

(True Extract.)

(Signed) R. H. SANKHEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
" Revenue Department.
" Superintendent of Works, Buckingham Canal.
" Examiner of Public Works Accounts.

Exd. S. T. Austin.
Spare Copies

GENERAL ACCOUNT.
Govt. of Madras.
PUBLIC WORKS.

To
The SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,
&c.,
&c.,
&c.

Dated February 7th.
Issued
Recd.
Encl.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectable Items.—Orders on Statement
of — in the Accounts of Executive Officers
for the month of November 1879 under
Imperial.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General
Account.

IMPERIAL, BUILDINGS AND ROADS.

Read the following paper:—

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

PART I.—Irregularities with respect to									
Item Number.	Particulars.	Number of Appear- ances in Statements of Objec- tionable Items.	Month in the Accounts of which Objec- tionable Expenditure first appeared.	Amount of Estimate	Expendi- ture up to Date.	Excess over Estimate	Expendi- ture during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.									
1	Buckingham Canal, Opening Ennore bar includ- ing groynes work.	5	July 1879 ..	Rs. ..	Rs. 4,285	Rs. 4,285	8	This office has nothing to add to the remarks made in the statement for October 1879.	It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 6th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer. 2. Vide paragraph 2 of G.O. No 3,297 W., dated 22nd December 1879. 3. Vide paragraph 6 of G.O. No, 3,297 W., dated 22nd December 1879.
2	Presidency. Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	Rs. ..	Rs. 1,500	Rs. 1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	
3	Rajahmundry. Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	Rs. ..	Rs. 200	Rs. 200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectable Items for November 1879. A reference has there- fore been made to him on the subject.	
4	Erecting barracks at Rajah- mundry and Ellore.	2	Oct. " ..	Rs. ..	Rs. 295	Rs. 295	..		
Total ..		..	..	Rs. ..	Rs. 6,280	Rs. 6,280	..		

Part I.—Irregularities with respect to Estimate up to the month of November 1879—cont.

Item Number.	Particulars.	Number of Appearances in Statements of Objectible Items.	Month in the Accounts of which Objectible Expenditure first appeared.	Amount of Estimate.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
6	Bangalore. General repairs to buildings in Parade Barracks.	1	Nov. 1879.	Rs. 1,420	Rs. 1,750	Rs. 330	Rs. 1,750	The Executive Engineer reports in his Statement of Objectible Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	North Arcot. Repairing and refitting the flag staff in the Vellore Fort.	1	" "	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectible Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O. No. 879 W. of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectible Items.	Month in the Accounts of which Objectible Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
	Works above Rs. 2,500.							
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879	1	Rs. 5,000	5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near Kavalu to Salt platform.	1	Nov. "	1	..	14,972	vide G.O. No. 3,297 W. of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879.

Timnevelly ..	..	1	1	745	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.
Ganjam ..	..	..	..	810	800		
Chingleput ..	..	..	..	1,036	1,116		
Rajahmundry ..	..	..	..	158	156		
Presidency ..	..	..	..	2,795	2,835		
Works below Rs. 2,500.		..	..	..	..		

(True Extract.) (Signed) R. H. SANKEY, Colonel, R.E., Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
Revenue Department.
Superintendent of Works, Buckingham Canal.
Examiner of Public Works Accounts.

Exd. S. T. Austin.
Spare Copies

Objectionable Items.—Orders on Statement of — in the Accounts of Executive Officers for the month of November 1879 under Imperial.

FEBRUARY.

G. O., 7th February 1880, No. 295 W.

Recd. Issued
Dated February 7th.
Encl.

To
The SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,
&c., &c., &c.

GENERAL ACCOUNT.
Govt. of Madras.
PUBLIC WORKS.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.
General Account.

Read the following paper:—

IMPERIAL, BUILDINGS AND ROADS.

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Rs.	Rs.	Rs.	Rs.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.										
1	Buckingham Canal. Opening Ennore bar including groynes work.	5	July 1879 ..	..	4,285	4,285	..	8	This office has nothing to add to the remarks made in the statement for October 1879.	It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 6th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
2	Presidency. Petty repairs carried out by Barrack Master, Presidency.	6	June ..	..	1,500	1,500	..	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. Vide paragraph 2 of G.O., No 3,297 W., dated 22nd December 1879.
3	Rajahmundry. Erecting cooking sheds at Rajahmundry.	2	Oct. ..	..	200	200	..	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.	3. Vide paragraph 6 of G.O., No, 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. ..	..	295	295	..	..		
Total ..		..	..	..	6,280	6,280	..	..		

Part I.—Irregularities with respect to Estimate up to the month of November 1879—*cont.*

Item Number.	Particulars.	Number of Accounts in which Objections of Objectable Items.	Month in the Accounts of which Objections first appeared.	Amount of Estimate	Expenditure up to Date.	Excess over Estimate	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
5	Bangalore. General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,750	Rs. 330	Rs. 1,750	The Executive Engineer reports in his Statement of Objectionable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	North Arcot. Repairing and refitting the flag staff in the Vellore Fort.	1	" "	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectionable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O. No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Accounts in which Objections of Objectable Items.	Month in the Accounts of which Objections first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	Rs. 5,000	Rs. 5,000	Completed in October 1879.	
Quintlr	Making a road from trunk road near K&valli to Salt platform.	1	Nov. "	1	..	14,972	Vide G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. Vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879.

Timevelly ..	Works below Rs. 2,500.	..	..	1	745	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.
Ganjam ..	..	..	..	12	810	800		
Chingleput ..	..	..	..	1	1,036	1,116		
Rajamahendry ..	..	..	..	5	138	156		
Presidency ..	..	..	..	..	2,795	2,835		

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
" Revenue Department.
" Superintendent of Works, Buckingham Canal.
" Examiner of Public Works Accounts.

Exd. S. T. Austin.
Spare Copies

Objectionable Items.—Orders on Statement of — in the Accounts of Executive Officers for the month of November 1879 under Imperial.

FEBRUARY.

G. O., 7th February 1880, No. 295 W.

Recd.

Issued

Dated February 7th.

To
THE SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,
&c.,
&c.,
&c.

GENERAL
ACCOUNT.
Govt. of (1880) Madras.
PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General.
Account.

Read the following paper :—

IMPERIAL, BUILDINGS AND ROADS.

Part I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Rs.	Rs.	Rs.	Rs.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
1	WITHOUT ESTIMATE. Buckingham Canal. Opening Ennore bar including groyne work.	5	July 1879 ..	..	4,285	4,285	..	8	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
2	Presidency. Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. <i>Vide</i> paragraph 2 of G.O., No 3,297 W., dated 22nd December 1879.
3	Rajahmundry. Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	..	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.	3. <i>Vide</i> paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. " ..	..	295	295	..	..		
Total ..		..	..	..	6,280	6,280	..	..		

Item Number	Particulars	Statements of Objectable Items	Month when Expenditure first appeared	Estimate	Date	Month	Remarks
5	EXCESS OVER ESTIMATE.						
	<i>Bangalore.</i> General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,750	Rs. 330	1,750
	<i>North Arcot.</i> Repairing and refitting the flag staff in the Vellore Fort.	1	" "	210	813	603	40
	Total ..	..	..	1,630	2,563	933	1,710
							The Executive Engineer reports in his Statement of Objectable Items for November 1879 that a revised estimate will be submitted for sanction shortly. The Executive Engineer has not furnished information regarding this work in his Statement of Objectable Items for November 1879, and a reference has therefore been made to him on the subject. 4. The submission of the revised estimate should be expedited. 5. This item has been disposed of by G.O., No. 879 W., of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	Rs. 6,000	Rs. 6,000	Completed in October 1879.	
Quadr	Making a road from trunk road near Kávali to Salt platform.	1	Nov. "	1	..	14,972	Vide G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. Vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879,

Tinnevely ..	For Rs below Rs. 2,500.	..	..	..	1	745	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.
Ganjam ..	..	..	..	..	1	810	800		
Chingaleput ..	..	..	..	..	12	1,036	1,116		
Rajamahendray ..	..	..	..	..	1	158	156		
Presidency ..	..	..	..	..	5	2,795	2,835		

(True Extract.)

(Signed) R. H. SANKER, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
" Revenue Department.
" Superintendent of Works, Buckingham Canal.
" Examiner of Public Works Accounts.

Exd. S. T. Austin.
Spare Copies

GENERAL
ACCOUNT.

Govt. of (1880) Madras.

PUBLIC WORKS.

To

The SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,

&c., &c., &c.

Dated February 7th.

Issued

Recd.

Encl.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statement
of — in the Accounts of Executive Officers
for the month of November 1879 under
Imperial.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General.
Account.

Read the following paper:—

IMPERIAL, BUILDINGS AND ROADS.

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appear- ances in Statements of Objec- tionable Items.	Month in the Accounts of which Objec- tionable Expenditure first appeared.	Rs.	Rs.	Rs.	Rs.	Expendi- ture up to Date.	Excess over Estimate	Expendi- ture during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.												
1	Buckingham Canal. Opening Ennore bar includ- ing groynes work.	5	July 1879 ..	..	4,285	4,285	..	..	..	..	This office has nothing to add to the remarks made in the statement for October 1879.	It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 6th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
2	Presidency. Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	..	..	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. <i>Vide</i> paragraph 2 of G.O., No 3,297 W., dated 22nd December 1879.
3	Rajahmundry. Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	..	..	..	..		
4	Rajahmundry. Erecting barracks at Rajah- mundry and Ellore	2	Oct	..	..	..	..	..	..	..		

Item Numb	Particulars.	Statement of Objective Items.	Month when Objective first appeared.	Estimate	to Date.	Month.	
EXCESS OVER ESTIMATE.							
6	Bangalore. General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,760	Rs. 330	Rs. 1,760
	North Arcot. Repairing and refitting the flag staff in the Vellore Fort.	1	" "	210	813	603	40
	Total ..	..	..	1,630	2,563	933	1,710
4. The submission of the revised estimate should be expedited. 5. This item has been disposed of by G.O. No. 879 W. of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.							

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Accounts in which Objective Items.	Month in the which Objective first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
Presidency	Maintenance of annual repairs to Esplanade roads.	2	Oct. 1879 ..	1	Rs. 5,000	Rs. 5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near K&rail to Salt platform.	1	Nov. " ..	1	..	14,972	Vide G.O. No. 3,297 W. of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. Vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879.

Tinnevely ..	Works below Rs. 2,500.	..	..	1	745	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.
Ganjnam ..	..	..	..	12	810	800		
Chingleput ..	..	..	..	1	1,036	1,116		
Rajahmundry ..	..	..	..	5	158	156		
Presidency ..	..	..	..	..	2,795	2,835		

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
Revenue Department.
Superintendent of Works, Buckingham Canal.
Examiner of Public Works Accounts.

3	Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	200	200
4	Erecting barracks at Rajahmundry and Ellore	2	Oct. " ..	..	..

sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.

2. Vide paragraph 2 of G.O. No 3,297 W., dated 22nd December 1879.

Objectionable Items.—Orders on Statement of — in the Accounts of Executive Officers for the month of November 1879 under Imperial.

To
The SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,
Cc.,
Cc.,
Cc.,
Dated February 7th.
Issued
Recd.
G. O., 7th February 1880, No. 295 W.
FEBRUARY.

GENERAL
ACCOUNT
Govt. of (1880) Madras
PUBLIC WORKS.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General
Account.

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Item Number.	Particulars.	Number of Appear- ances in Statements of Objec- tionable Items.	Month in the Accounts of which Objec- tionable Expenditure first appeared.	Amount of Estimate	Expendi- ture up to Date.	Excess over Estimate	Expendi- ture during Month.	Opinion of the Superintendent Engineer with Final Remarks by Examiner.	Orders by Local Government.
WITHOUT ESTIMATE.									
1	Buckingham Canal. Opening Ennore bar includ- ing groynes work.	5	July 1879 ..	Rs. ..	Rs. 4,285	Rs. 4,285	Rs. ..	8 This office has nothing to add to the remarks made in the statement for October 1879.	Order thereon, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 6th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer. 2. Vide paragraph 2 of G.O., No 3,297 W., dated 22nd December 1879.
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3	Rajahmundry. Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	..	The P	
4	Rajahmundry. Erecting barracks at Rajah- mundry and Ellore	2	Oct. " " ..	..	200	200	..		
3	Erecting cooking sheds at Rajahmundry.	2	Oct. " " ..	..	200	200	..		
4	Erecting barracks at Rajah- mundry and Ellore	2	Oct. " " ..	..	200	200	..		

Part I.—Irregularities with respect to Estimate up to the month of November 1879—cont.

Item Number.	Particulars.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Amount of Estimate	Expenditure up to Date.	Excess over Estimate	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Order by Local Government.
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	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objectable Items.	Month in the Accounts of which Objectable Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
Presidency ..	Maintenance of annual repairs to, Eglamade roads. Works above Rs. 2,500.	2	Oct. 1879 ..	1	Rs. 5,000	5,000	Completed in October 1879.	
Guntur ..	Making a road from trunk road near Kaval to Salt platform.	1	Nov. "	1	..	14,972	Vide G.O., No. 3,297 W., of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. Vide Chief Engineer's memorandum No. 3,735, dated 8th December 1879,

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Chingleput ..	..	..	..	..	12	1,036	1,116		
Rajahmundry ..	..	..	..	..	1	158	156		
Presidency ..	..	..	..	..	5	2,795	2,835		
Works below Rs. 2,500.									

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
" Revenue Department.
" Superintendent of Works, Buckingham Canal.
" Examiner of Public Works Accounts.

Exd. S. T. Austin.
Spare Copies

GENERAL ACCOUNT.

Govt. of Madras.

PUBLIC WORKS.

To

THE SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,

&c., &c., &c.

Dated February 7th.

Issued

Recd.

Encl.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statement of — in the Accounts of Executive Officers for the month of November 1879 under Imperial.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General.
Account.

Read the following paper:—

IMPERIAL, BUILDINGS AND ROADS.

PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	Amount of Estimate	Expenditure up to Date.	Excess over Estimate	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
1	WITHOUT ESTIMATE. <i>Buckingham Canal.</i> Opening Ennore bar including groynes work.	6	July 1879 ..	..	4,285	4,285	..	8 This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON, 7th February 1880, No. 295 W. It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 5th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
2	<i>Presidency.</i> Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. <i>Vide</i> paragraph 2 of G.O., No 3,297 W., dated 22nd December 1879.
3	<i>Rajahmundry.</i> Erecting cooking sheds at Rajahmundry.	2	Oct. " ..	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.	3. <i>Vide</i> paragraph 6 of G.O., No, 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. " ..	..	295	295	..		
Total ..		..	..	..	6,280	6,280	..		

GENERAL ACCOUNT.

Govt. of Madras.

PUBLIC WORKS.

THE SUPERINTENDING ENGINEERS,
FIRST, SECOND, THIRD, AND
FIFTH CIRCLES,
&c., &c., &c.

Dated February 7th.

Issued

Recd.

Encl.

G. O., 7th February 1880, No. 295 W.

FEBRUARY.

Objectionable Items.—Orders on Statement of — in the Accounts of Executive Officers for the month of November 1879 under Imperial.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General Account.

Read the following paper:—

IMPERIAL, BUILDINGS AND ROADS.
PART I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Appearances in Statements of Objectionable Items.	Month in the Accounts of which Objectionable Expenditure first appeared.	RS.	RS.	Expenditure up to Date.	Excess over Estimate.	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
1	WITHOUT ESTIMATE. <i>Buckingham Canal.</i> Opening Ennore bar including groyne work.	6	July 1879 ..	..	4,285	4,285	..	..	This office has nothing to add to the remarks made in the statement for October 1879.	It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 6th December 1879. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
2	<i>Presidency.</i> Petty repairs carried out by Barrack Master, Presidency.	6	June ..	..	1,500	1,500	..	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	2. <i>Vide</i> paragraph 2 of G.O., No. 3,297 W., dated 22nd December 1879.
3	<i>Rajahmundry.</i> Erecting cooking sheds at Rajahmundry.	2	Oct. ..	..	200	200	..	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.	3. <i>Vide</i> paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. ..	..	295	295	..	..		
Total ..		..	..	..	6,280	6,280	..	..		

Part I.—Irregularities with respect to Estimate up to the month of November 1879—*cont.*

Item Number.	Particulars.	Number of Appearances in Statements of Objective Items.	Month in the Accounts of which Objective Expenditure first appeared.	Amount of Estimate	Expenditure up to Date.	Excess over Estimate	Expenditure during Month.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
EXCESS OVER ESTIMATE.									
6	<i>Bangalore.</i> General repairs to buildings in Parade Barracks.	1	Nov. 1879 ..	Rs. 1,420	Rs. 1,750	Rs. 330	Rs. 1,750	The Executive Engineer reports in his Statement of Objectionable Items for November 1879 that a revised estimate will be submitted for sanction shortly.	4. The submission of the revised estimate should be expedited.
	<i>North Arcot.</i> Repairing and refitting the flag staff in the Vellore Fort.	1	" ..	210	813	603	40	The Executive Engineer has not furnished information regarding this work in his Statement of Objectionable Items for November 1879, and a reference has therefore been made to him on the subject.	5. This item has been disposed of by G.O. No. 879 W. of 25th March 1879, in which funds to the extent of Rs. 1,010 were provided for the work. The only irregularity is the non-submission of the completion certificate which should be explained.
	Total ..	..	..	1,630	2,563	933	1,710		

Miscellaneous Irregularities.

Division.	Name of Work.	Number of Appearances in Statements of Objective Items.	Month in the Accounts of which Objective Expenditure first appeared.	Number of Works.	Amount of Estimate.	Amount Expended.	Remarks by Examiner.	Orders by Local Government.
COMPLETION REPORTS NOT SUBMITTED TO EXAMINER.								
Presidency	Maintenance of annual repairs to Esplanade roads. <i>Works above Rs. 2,500.</i>	2	Oct. 1879 ..	1	Rs. 5,000	5,000	Completed in October 1879.	
Guntur	Making a road from trunk road near Kávali to Salt Platform.	1	Nov. ..	1	..	14,972	<i>Vide</i> G.O. No. 3,297 W. of 22nd December 1879, in which the completion report was ordered to be submitted to Examiner.	6. <i>Vide</i> Chief Engineer's memorandum No. 3,735, dated 8th December 1879,

Tinnevely ..	Works below Rs. 2,500.	..	..	1	745	744	Government are particularly requested to impress upon the Superintending Engineers the importance of a more punctual submission of completion reports.	requiring the more punctual submission of these documents.
Ganjam ..	..	..	..	1	810	800		
Chingaleput ..	..	..	..	12	1,036	1,116		
Rajamahendry ..	..	..	..	1	158	156		
Presidency ..	..	..	..	5	2,795	2,835		

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.
Secretary to Govt., P.W.D.

To the Superintending Engineers, First, Second, Third, and Fifth Circles.
" Revenue Department.
" Superintendent of Works, Buckingham Canal.
" Examiner of Public Works Accounts.

Exd. S. T. Austin,
Spare Copies

Appendix to G.O., No. 284 W., of 6th February 1880.

OBSERVATIONS BY THE CHIEF ENGINEER ON MAJOR VIBART'S BUCKINGHAM CANAL INSPECTION NOTES DATED 27TH SEPTEMBER 1879.

Paragraph 1.—The requisite survey establishment has been sanctioned, and the Superintendent of Works, Captain Awdry, is engaged in preparing the estimate for submission to the Government of India. Tide gauges have been established in all backwaters and open estuaries, as also at intermediate points along the canal.

2. Paragraph 3.—For sanitary purposes it is most desirable that the level of the water in the Cooum and Adyar rivers should, as far as possible, be maintained at 3.5 feet above mean sea level, and to do this the lock here proposed would be indispensable, as with the Covelong bar open (maximum rise of tide 2.92 feet above and low water 0.70 below M.S.L.) the water would otherwise escape through the southern canal. The necessity for constructing a dam here is not sufficiently apparent to warrant the work being included in the estimate as yet.

3. Paragraph 4.—Under the present arrangements for taking the tolls, the proposed landing place would not help traffic, but Captain Awdry has a proposal for altering the sections so soon as the channel shall be open as far as the Cheyoor backwater, which if combined with a proper opening, headway being given to the South Indian Railway bridge, would permit and encourage traffic through the Junction Canal.

4. Paragraph 5.—Appended is a detailed statement of the spans and headways of the bridges, the former being generally under 20 feet each, and the latter as low as 9.22 feet at M.S.L. The headway is thus only 5.72 feet when the level of the water is 3.5 feet above M.S.L., and is therefore much too low. The expense of altering all these bridges, fourteen in number, would be prohibitory for the present, but means should be found by corbeling or otherwise to provide an 18-inch wide board for the towing coolies to pass. To prevent water escaping from the Cooum when the Adyar bar is open, a lock should be built at south end of the Junction Canal. So long as it can be managed without injury to the channel or the bridges a scour may be provided for in order to remove silt.

STATEMENT showing the clear headway and span of Bridges over the Buckingham Canal.

Mileage from Basin.	Name of Bridges.	Minimum span at M.S.L. in feet.	Maximum height above M.S.L. in feet.	Remarks.	Height available above M.S.L. for boats	
					With tops 10 feet wide.	With tops 13 feet wide.
M. F.	Bridges north of Cochrane's Basin.					
0 4	Ráyapuram Railway bridge ..	59	10.72	Iron girder bridge ..	10.72	10.72
1 4½	Washermanpettah bridge ..	43	10.00	Masonry segmental arch ..	9.60	9.40
3 6	Theroovattoor bridge ..	43	10.00	Do. do. ..	9.68	9.36

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1880, No. 295 W.

General Account.

Read the following paper:—

IMPERIAL, BUILDINGS AND ROADS.

Part I.—Irregularities with respect to Estimate up to the month of November 1879.

Item Number.	Particulars.	Number of Accounts in which Objections of Items.	Month in the Accounts of which Objections first appeared.	Rs.	Rs.	Rs.	Rs.	Opinion of the Superintending Engineer with Final Remarks by Examiner.	Orders by Local Government.
1	WITHOUT ESTIMATE. Buckingham Canal. Opening Ennore bar including groyne work.	5	July 1879 ..	..	4,285	4,285	..	This office has nothing to add to the remarks made in the statement for October 1879.	ORDER THEREON 7th February 1880, No. 295 W.
2	Presidency. Petty repairs carried out by Barrack Master, Presidency.	6	June " ..	..	1,500	1,500	..	The required estimate has not as yet been sanctioned for this work. A reply to this office letter No. 617 S.E. 3rd, dated 16th October 1879, on the subject is awaited.	It is reported that an estimate for this work was submitted to the Salt Commissioner for his countersignature on the 6th December 1878. The Commissioner will be requested to expedite its return to the proper Public Works Officer.
3	Kajalammudy. Erecting cooking sheds at Kajalammudy.	2	Oct. " ..	..	200	200	..	The Executive Engineer has not furnished any information as regards these works in his Statement of Objectionable Items for November 1879. A reference has therefore been made to him on the subject.	3. Vide paragraph 6 of G.O., No. 3,297 W., dated 22nd December 1879.
4	Erecting barracks at Rajahmundry and Ellore.	2	Oct. " ..	..	296	296	..		
Total ..		..	..	..	6,280	6,280	..		

Statement showing the clear headway and span of Bridges over the Buckingham Canal—cont.

Mileage from Basin.	Name of Bridges.	Minimum span at M.S.L. in feet.	Maximum height above M.S.L. in feet.	Remarks.	Height available above M.S.L. for boats	
					With tops 10 feet wide.	With tops 13 feet wide.
M. F.	Bridges south of Basin.					
0 0	Basin bridge ..	50-00	12-52	Masonry segmental arch ..	12-17	11-94
0 4	Salt Cotaun bridge ..	29-66	8-64	Wooden bridge ..	8-64	8-64
0 6½	Elephant Gate bridge ..	49-00	10-94	Masonry segmental arch ..	10-52	10-23
0 7	Central Station Railway bridge ..	64-00	9-35	Iron girder bridge ..	9-35	9-35
1 4½	General Hospital bridge ..	49-00	11-04	Masonry segmental arch ..	10-62	10-38
1 6	South Indian Railway bridge ..	13-91	7-03	Wooden bridge ..	7-03	7-03
2 3	Saint Mary's bridge ..	29-00	11-49	Do. metalled ..	11-49	11-49
3 0	Government House bridge ..	32-00	10-40	Masonry segmental arch ..	9-74	9-53
3 2	Marine Villa ..	19-83	10-92	Iron piles rough stone abutments.	10-92	10-92
3 6	Chepaik bridge ..	19-62	10-92	Masonry segmental arch ..	9-92	9-17
3 7½	Pycroft's road bridge ..	19-62	11-29	Do. do. ..	10-29	9-54
4 2	Soonkarammah Street bridge ..	20-17	11-52	Masonry and wooden platform.	11-52	11-52
4 6½	Ice House road ..	19-83	11-68	Masonry segmental arch ..	10-68	9-93
5 0	Elliott's road ..	20-17	11-77	Masonry semicircular arch ..	10-44	9-35
5 3½	Barber's bridge ..	27-33	9-71	Masonry and wooden platform.	9-71	9-71
5 5	Moondacunny Covil road bridge ..	20-00	13-22	Do. do. ..	13-22	13-22
5 6½	Cutcherry road ..	19-58	10-42	Masonry semicircular arch ..	9-09	8-00
6 3	Brodie's road bridge ..	20-17	10-89	Do. do. ..	9-68	8-77
6 3	Poonthotum aqueduct ..	20-42	10-05	Masonry wooden platform ..	10-05	10-05
7 1½	Yellapatha Mauda Covil road ..	20-25	9-22	Do. do. ..	9-22	9-22
7 1½	Soolay Cauthoy Syphon ..	21-83	10-00	Do. do. ..	10-00	10-00
8 0	Greenaway's bridge ..	21-00	13-03	Masonry segmental arch, skew ..	12-03	11-03
8 0	Guindy bridge, span excluding tow paths.	45-00	15-42	Masonry elliptical arch ..	15-17	15-09
10 0	Lattice bridge do. do. ..	43-00	12-14	Masonry abutments and wooden structure.	12-14	12-14
42 0	Sadras bridge do. do. ..	43-75	13-83	Masonry elliptical arch ..	13-58	13-50
45 0	Ismalpett bridge do. do. ..	33-00	14-75	Masonry semicircular arch ..	14-38	14-13

* The figures in antique show the Bridges having the least headway.

5. Paragraph 7.—Observations concurred in.
6. Paragraph 8.—A flood-gate which would form no impediment to traffic would answer all purposes.
7. The sewage of all the north portion of Black Town should unquestionably be diverted from discharging into the canal by an intercepting sewer, to be constructed by the Municipality.
8. Paragraph 9.—Agreed.
9. Paragraph 10.—Approved, but the question will require further study. Some of the present lime kilns which occupy the needed ground must be removed.
10. Paragraph 12.—New bridges should be provided for, but the removal of the present structures is not a matter of urgency.
11. Paragraphs 13 and 14.—This lock has not sufficient height to clear it in maximum floods, and is at least half a mile too far north. It will be necessary to remove this lock and take a new isolated channel from 6 M. 6 F. through the ground to the east as far as 9 M. 3 F. where there should be a flood-gate. By these arrangements the canal will be preserved from the effects of the floods of the Kortalayár and of the Red Hill tank drainage, from both of which it now suffers greatly at times.
12. Paragraph 15.—From 11½ to 20½ M. should be taken in a new isolated channel east of the backwater, with flood-gates at either end. The existing deep portion of canal between 17 M. and 19 M. might be included in this new line. Owing to the oozy nature of the bottom in the existing backwater, dredging would have no permanent effect.
13. The opening into the Chintamony backwater will have in any case to be left open for the free passage of flood water. From immediately beyond this point, and to the entrance of the lake beyond the town of Pulicat, careful study is required. So far as can

be judged, however, a feasible plan would seem to consist in making an isolated channel 4½ miles in length along the west margin of the backwater, between 20½ M. and 25 M., with flood-gates at either end.

14. I do not approve of the proposal to bank across the opening at 20½ M., nor to take the canal along the east margin close up to the bar; this would certainly be dangerous for boats during flood.

15. Paragraph 17.—The only apparent means for ensuring a sufficiently protected line along all this portion will be to take a new isolated line, as proposed, along the depression which commences a little north of the Pulicat bar. Some palliatives are feasible, e.g., altering slightly the end of the south cut in the lake so as to carry it into deep water, but there is no radical cure apparently for the admitted difficulties of the present line, which is throughout exposed to the wide expanse of water on the west.

16. The only part of the line which can be considered as adequately protected between Pulicat and Cusbah is the short portion between 35 M. 7 F. and 38 M., and this of course can be taken into the new line.

17. From a peculiarity in the conformation of the Pulicat lake, it appears that, when the waters of excessive floods begin to subside, the canal from a little north of 36 M. acts as a surplus channel. A very beneficial scour is thus found to have been set up throughout the line to its southern debouchure in the lake at 27 M. This peculiarity should be turned to use for the new isolated line by the construction of a powerful head sluice in the west bank at 36 M., and a scour produced in the channel down to the bar whenever circumstances favor. A sluice with five or six openings, 6 feet wide each, would apparently suffice.

18. Whether a flood-gate would be needed at the southern extremity near the Pulicat bar is not as yet clear.

19. Paragraph 22.—From Cusbah, 45 M., northwards a strong west bank, well above flood level, is essential, and the canal should be isolated up to 68 M., where a flood-gate may be placed. An interval will here have to be left for the passage of flood water, and the new cut to the west of the backwater, as suggested by Major Vibart, made up to Dugarápatnam, 69 M. This short portion will also need to be isolated by flood-gates at either end. The proposed basin at Dugarápatnam should, as elsewhere, consist of a simple widening of the channel.

20. Paragraph 24.—If on further inquiry the drainage which enters at 71 M. 5 F. cannot safely be barred from entering the canal, a flood-gate must be placed a little north. I do not consider a sluice weir, as proposed here, to be suitable. Another flood-gate will be needed a little south of the Swarnamukhi river. This reach of canal, 4 miles in length, will thus, with the embankments proposed, be thoroughly isolated in case of flood.

21. Paragraph 25.—The crossing of the Swarnamukhi river is a complicated matter, and calls for further examination. So far as can be judged, Major Vibart's proposed deviation from a point near the village of Govindapulli to Mullapulli, combined with training the river by means of embankments and strongly constructed cross bunds east and west, appears to hold out the best solution.

22. Paragraph 27.—No remark called for further than that at either extremity of these 14 miles of canal flood-gates might with advantage be placed. It does not appear essential to make so long a deviation, (1 mile in length,) as proposed here by Major Vibart. If the present end of the channel as it enters the Kundalairoo river is turned east and north for about 2 furlongs, and made to enter the backwater close to the west of the Gungapalliem village, it will answer all purposes, as the backwater is believed to remain permanently deep at this point.

23. Paragraph 30.—The Kistnapatam basin must be extended as proposed. A flood-gate will be required south of the basin, and as regards the canal to the north, the banks must be raised and the channel isolated.

24. Paragraph 31.—At Nellatoor it will be necessary to cut a fresh channel for nearly two miles (95 M. 4 F. to 97 M. 6 F.,) a little east of the present line in rather higher ground, thus leaving the present channel free for the passage of drainage.

Statement showing the clear headway and span of Bridges over the Buckingham Canal—cont.

Mileage from Basin.	Name of Bridges.	Minimum span at M.S.L. in feet.	Maximum height above M.S.L. in feet.	Remarks.	Height available above M.S.L. for boats	
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3 2	Chepauk bridge	19-62	10-92	Masonry segmental arch	9-92	9-17
3 6	Pycroft's road bridge	19-62	11-29	Do. do.	10-29	9-54
3 7½	Soonkarammah Street bridge	20-17	11-52	Masonry and wooden platform.	11-52	11-52
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5 5	Cutcherry road	19-58	10-42	Masonry semicircular arch	9-09	8-00
5 5½	Brodie's road bridge	20-17	10-89	Do. do.	9-68	8-77
6 3	Poonthotum aqueduct	20-42	10-05	Masonry wooden platform	10-05	10-05
6 3	Yellapatha Mauda Covil road	20-25	9-22	Do. do.	9-22	9-22
7 1½	Soolay Cauthoy Syphon	21-83	10-00	Do. do.	10-00	10-00
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* The figures in antique show the Bridges having the least headway.

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6. Paragraph 8.—A flood-gate which would form no impediment to traffic would answer all purposes.
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8. Paragraph 9.—Agreed.
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11. Paragraphs 13 and 14.—This lock has not sufficient height to clear it in maximum floods, and is at least half a mile too far north. It will be necessary to remove this lock and take a new isolated channel from 6 M. 6 F. through the ground to the east as far as 9 M. 3 F. where there should be a flood-gate. By these arrangements the canal will be preserved from the effects of the floods of the Kortalayár and of the Red Hill tank drainage, from both of which it now suffers greatly at times.
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14. I do not approve of the proposal to bank across the opening at 20½ M., nor to take the canal along the east margin close up to the bar; this would certainly be dangerous for boats during flood.

15. Paragraph 17.—The only apparent means for ensuring a sufficiently protected line along all this portion will be to take a new isolated line, as proposed, along the depression which commences a little north of the Pulicat bar. Some palliatives are feasible, e.g., altering slightly the end of the south cut in the lake so as to carry it into deep water, but there is no radical cure apparently for the admitted difficulties of the present line, which is throughout exposed to the wide expanse of water on the west.

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18. Whether a flood-gate would be needed at the southern extremity near the Pulicat bar is not as yet clear.

19. Paragraph 22.—From Cusbah, 45 M., northwards a strong west bank, well above flood level, is essential, and the canal should be isolated up to 68 M., where a flood-gate may be placed. An interval will here have to be left for the passage of flood water, and the new cut to the west of the backwater, as suggested by Major Vibart, made up to Dugarápatnam, 69 M. This short portion will also need to be isolated by flood-gates at either end. The proposed basin at Dugarápatnam should, as elsewhere, consist of a simple widening of the channel.

20. Paragraph 24.—If on further inquiry the drainage which enters at 71 M. 5 F. cannot safely be barred from entering the canal, a flood-gate must be placed a little north. I do not consider a sluice weir, as proposed here, to be suitable. Another flood-gate will be needed a little south of the Swarnamukhi river. This reach of canal, 4 miles in length, will thus, with the embankments proposed, be thoroughly isolated in case of flood.

21. Paragraph 25.—The crossing of the Swarnamukhi river is a complicated matter, and calls for further examination. So far as can be judged, Major Vibart's proposed deviation from a point near the village of Govindapulli to Mullapulli, combined with training the river by means of embankments and strongly constructed cross bunds east and west, appears to hold out the best solution.

22. Paragraph 27.—No remark called for further than that at either extremity of these 14 miles of canal flood-gates might with advantage be placed. It does not appear essential to make so long a deviation, (1 mile in length,) as proposed here by Major Vibart. If the present end of the channel as it enters the Kundalairoo river is turned east and north for about 2 furlongs, and made to enter the backwater close to the west of the Gungapalliem village, it will answer all purposes, as the backwater is believed to remain permanently deep at this point.

23. Paragraph 30.—The Kistnapatam basin must be extended as proposed. A flood-gate will be required south of the basin, and as regards the canal to the north, the banks must be raised and the channel isolated.

24. Paragraph 31.—At Nellatoor it will be necessary to cut a fresh channel for nearly two miles (95 M. 4 F. to 97 M. 6 F.,) a little east of the present line in rather higher ground, thus leaving the present channel free for the passage of drainage.

25. *Paragraph 32.*—The whole of the drainage here must be collected and passed across the channel at one point.

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27. *Paragraph 34.*—The Pennér river (114 M. 3 F. to 116 M. 6 F.) crossing is probably the most difficult matter to deal with in the length of the canal. Some Rs. 11,000 were spent in taking the silt out of the cut here (115 M. 4 F. and 116 M. 3 F.) within the first year of opening the canal, and in both the cyclones of 1879 not only has the same cut again silted up to within 9 inches of L.W.L., but the several branches of the river, five in number, show such a tendency to change their course that it has become a serious matter for consideration as to how the canal can here be kept open for traffic. Even were steam-dredges available, the canal would still be closed after each ordinary fresh in the river to all but top-boats and others of very light draft taking advantage of high tide, and the stoppage would be absolute after a cyclone flood of any intensity. No mere palliatives will therefore answer here, and my conviction is that the best and, in the end, by far the most economical course will be to train the Pennér in such a way from the head of its delta that the discharge shall take place entirely through its southernmost channel, closing all the others. This can be done by training the river from a point near the village of Utakoor, about three miles west of the canal, on the left bank. At the same time, groynes should be so constructed on the right bank, a little north of Kuddipalem, that the present line of river bank and the flood embankment within it shall be preserved from invasion. The left embankment would probably extend from Utakoor to the destroyed village of Palipalem. By this means not only would a sufficiently deep channel be always preserved in the southern branch of the river, but by closing the canal ends north and south with flood-gates, these would be preserved from the silting which now causes the difficulty. I do not consider that there should be any serious difficulty in training the Pennér as proposed, but further careful study of all the features is necessary.

28. *Paragraphs 37 and 38.*—Banking across the Ramatheertham drainage is inadmissible; it will be essential to cut a new line, of about six furlongs in length, to the west of the present line, so as to avoid getting dangerously close to the bar.

29. *Paragraphs 39 and 40.*—As with the Ramatheertham so with the Pydaru (123 M. 6 F.) and the Eskapally (126 M.) drainages, free vent must be allowed across the line of canal, but a strong west bank to keep out floods should be constructed. Whether it will be necessary eventually to isolate each of these portions with flood-gates (that at 117 M. is essential) cannot however be decided with certainty.

30. *Paragraph 42.*—The plan suggested of training the river so as to occupy and deepen out its central channel, and further to make a new cut to the west, of about two miles long, through ground 3 or 4 feet above M.S.L., seem essential. Since the cyclone of May 1879 the existing channel through the backwater has changed no less than four times.

31. Flood-gates will be required, one north of the Chippelairoo, at probably 134 M. and another at the 148 M. 2 F.

32. *Paragraph 46.*—The Ramapatam drainage, which enters at 148 M. 3 F. might have its outlet to the sea barred permanently, and the drainage thus taken into the canal utilised with a view to bringing a beneficial scour to bear on the northern portion towards the Elikeru.

33. *Paragraph 47.*—As regards this drainage it will be best to embank across the northern outlet, placing a flood-gate at 151 M. leaving the present southern opening (150 M. 6 F. to 150 M. 7 F.) free to discharge by the open bar.

34. To prevent the silting of the channel south of the Manneru, a flood-gate will be necessary at about 160 M.

35. The spill of the Manneru floods over the left bank of the river must be stopped by an embankment, but the most essential work here; and one which there should be no delay in carrying out, is the deviation of the present channel for about three furlongs in length, as suggested by Major Vibart. Without any cyclone flood in 1878 some three miles of channel here silted up to a depth of over 2 feet with ordinary

freshets, and there can be no question that flood-gates are essential at both the Manneru and Palar ends of this reach of the canal.

36. *Paragraphs 49 and 50.*—Agreed. It is essential that the spill of the Paleru floods over its right bank should be barred by a strong embankment from the north end of the present Pakala bank as far as the canal.

37. *Paragraph 51.*—The short portion of canal, six furlongs in length, between the Moosee and Palar rivers, having silted up in both the May and November cyclones of 1879, barring navigation, some early and effective means must be found for curing the present defects.

38. Hand-dredging alone has not sufficed to allow of a passage being opened for any but boats of very light draft at high tide within two months after the last flood, and even then cargo boats drawing over 1' 9" have had to unload and have the goods carried by hand three-quarters of a mile. For a short time after the November cyclone there was a passage to the east, close to the united bars of the two rivers, but this did not last long. Had powerful steam-dredges been available, and at once set to work, a passage might no doubt have been opened at an earlier date, but at the best it may be assumed that, subsequent to each of the cyclones of last year, this portion of the canal must have been closed to traffic for five or six weeks; it is thus clear that exceptional measures are called for to prevent as far as possible the recurrence of such delays, which if allowed to continue must affect very injuriously the traffic on the canal. Were it feasible to divert one or other river, so as to discharge both streams by a single channel into the sea, the difficulty now experienced would vanish, but as this means cannot I consider be adopted, it appears that the most effective and economical plan will be to excavate a second channel parallel to, and a little west of, the present cut, six furlongs long. This channel, measuring 15 feet in breadth at bottom and carried to 2½ feet below M.S.L., should be excavated as soon as possible. When opened to traffic the existing channel should be closed, cleared and deepened, opened for traffic, and the new subsidiary canal closed by temporary banks and prepared to receive the traffic after the next flood. By thus working alternately on two channels alongside of each other a feasible palliative for the existing difficulties will at least be provided. No west bank will be needed for the new channel, all spoil going to form a high strong bank for the existing cut so as to insure its isolation. Flood-gates at each extremity of the latter will also be needed, if not indeed for both channels.

39. *Paragraph 57.*—The preservation and management of the stretch of canal from one mile north of the Moosee bar (about 170 M.) to the Gundlakamma river depends on the treatment of the spill of the former river during flood over its left bank. Whether it be feasible to train the river by means of a left embankment, starting from a point near the village of Tirupu Nayadipalum, and thus force the whole floods through the present bar, is not clear, but the subject should receive attention.

40. For the present, immediate relief will be given by cutting away entirely the banks which were injudiciously thrown across the Tondairoo creek at 177 M. 2 F. and again at 177 M. 6 F. The effect of any further flood will be to bring a beneficial scour to bear on the whole length of the channel northward, towards the Gundlakamma.

41. Should, however, the training bank for the left bank of the Moosee river as suggested prove feasible, it would in that case probably be desirable to cut a fresh channel for the canal in the four furlongs a little to the east, so as to keep clear of the Tondairoo creek as proposed by Major Vibart. There should be a flood-gate at the end of the canal as it enters the Moosee river.

42. *Paragraphs 57 and 58.*—The basin at Kottapatam may, as suggested, consist of nothing more than an enlargement of the channel to the east and north of the present bridge. This latter, though shaken by the November cyclone, is now sufficiently secure to last with repairs for some years, and though boats in passing it have to lower their masts, there is no serious inconvenience, as they invariably halt at the place.

43. The road dam immediately west of the bridge must be removed (as being much too close to the canal) to a point on the Ongole road 300 yards further west; and be

there reconstructed 100 yards in length, lowest point of invert being 1 foot above H.W.L. The materials of the present dam will nearly suffice for the new, and the same style of tail apron should be employed. The western embankment of the canal (south of the bridge) should be much strengthened, and the road well raised over the site of the present dam, so as effectually to prevent any future invasion by flood water. The laterite bridge, which with its nine elliptical arches of 18 feet span carries off all the residue of the Tondairoo drainage not vented by the canal, should be thoroughly repaired as its flooring is still sound. The unworkman-like additions made on either side of the arches to bear the parapets, and which were much injured by the November flood, must be removed and the roadway reduced to about $9\frac{1}{2}$ feet in width. The removal and reconstruction of the road dam above adverted to must be charged to the canal, but the alterations of the bridge ought to devolve on the Local Fund Board, who may also fairly undertake the construction of the proposed Moosafirkhana at Utapotu.

44. Paragraphs 59, 60, 61.—Northward from Kottapatnam (179 to 187 M.) the banks originally low have suffered severely during the November cyclone, first by the action of the storm wave from the east, there being no protecting "dunes" here, and second, from the land flood which supervened. But notwithstanding this destruction of the banks the channel has been, if any thing, improved owing to the fact that the surplus of the Moosee river flood vented itself through the Tondairoo creek, and finding its way into the canal scoured it throughout and cleared it of silt. Practically, therefore, little work is required in this reach. In a few places a strong, well planted, east bank will be needed to counteract the action of a storm wave; but on the west the less obstruction presented to the land flood the better, unless at some future time the expense of a sufficiently high and strong isolating west bank be considered essential. As matters stand, levelling down the bank as much as possible and bringing the tow-path into order is all that need be thought of. No vegetation seems to thrive here owing to the salt dust carried by the west winds which smothers and kills even the "woolsa" rush and the salt plant "eela," both of which thrive elsewhere. So long as the channel is not isolated no flood-gate is necessary at the Gundlakamma.

45. Paragraph 62.—The crossing of the Gundlakamma river calls for no special remark.

46. Paragraph 63.—As regards the proposals in this paragraph I have seen reason for the present at least to prefer flood-gates nearly everywhere to locks, the grounds for which will be found elsewhere.

47. Paragraph 64.—For five miles north of the Gundlakamma river the canal is exposed to serious wash, particularly at two places where bars opened in the November cyclone, and which must therefore be left free of any obstruction. To all appearances, however, the spill water from the Gundlakamma might, as suggested by Sub-Engineer Ottmann, be effectually checked by constructing a strong training bank along the left bank of the river, two or three miles in length, and diverting the drainage from the Kanuparti swamp. The alternative to this plan would be to construct a strong west bank all along the canal. In addition to protection on the west, a well-planted east bank is also needed at two places, but only for short lengths. Major Vibart has suggested an entirely new channel between $199\frac{1}{2}$ and $191\frac{1}{2}$ M. but as the object here must be to get sufficiently inland from the Kanuparti bar, to which the present line is dangerously near, it will suffice to make the new cut to the westward of only three furlongs in length at a distance of 200 yards from the existing channel.

48. Paragraphs 66, 67, 68.—Little remark called for. It may be doubted whether the position of the new lock at Feringy Dibba has been judiciously selected, and whether, looking to the great drainage which sweeps over the whole country south of Santaravoor, it would not have been safer to have given another flight to this latter lock, and dropped the canal thus direct into the Rompairoo drainage. It is now however too late to suggest any alteration of the arrangements here.

49. Paragraph 69.—The reasoning here employed by Major Vibart in favor of isolating the different reaches of the canal which intervene between drainages that cannot safely, particularly during flood, be barred in the passage to the sea, derives additional force from the effects of the November cyclone which followed on the

one which occurred in May and which is the subject of his report. But there is such a strong and, it must be admitted, well-founded objection to the delays inseparable from locks, added to the great expense of first construction and subsequent working, a regular establishment being necessary for each all the year round, that I have proposed for the present at least to construct flood-gates at the end of each reach. These would only be closed on extreme occasions to exclude silt and flood from the channel. They would be comparatively cheap in construction, could be made portions of locks at any future time should such be considered requisite, would in no way interfere with or delay traffic, and need only have a small establishment to look after them in the cyclone or flood period. Inlet weirs I also see no immediate necessity for, but the depth of the canal and even its section may now with advantage be much diminished to meet actual requirements. These and other subjects will however be discussed in a separate paper.

50. Paragraph 70.—The training of the several large drainages, and the necessity for a special study of each case, has been sufficiently pointed out in the above remarks, but here, as elsewhere, Major Vibart seems to favor the use of inlets and outlets of masonry for the disposal of minor drainages. I very much question the applicability of works of this character to the canal, as in hardly any case is there means of securing a proper outfall for the water on the down or eastern side of the channel. There may however be a few cases in which the principle might be accepted, and where this is the case the plan might be tried, adding however a capacious silt trap on the upper or west side of the canal. This should be kept always clear. It seems to me that all drainages which cannot be effectually shut out and diverted into other lines must of necessity be allowed free vent at a level across the canal, and that everything in the shape of an obstruction would be a mistake.

R. H. SANKEY, Colonel, R.E.,
Chief Engineer.

CHEPAUK,
10th April 1880.

Appendix to G.O., No. 281 W., of 6th February 1880.

OBSERVATIONS BY THE CHIEF ENGINEER ON MAJOR VIBART'S BUCKINGHAM CANAL INSPECTION NOTES DATED 27TH SEPTEMBER 1879.

Paragraph 1.—The requisite survey establishment has been sanctioned, and the Superintendent of Works, Captain Awdry, is engaged in preparing the estimate for submission to the Government of India. Tide gauges have been established in all backwaters and open estuaries, as also at intermediate points along the canal.

2. *Paragraph 3.*—For sanitary purposes it is most desirable that the level of the water in the Cooum and Adyar rivers should, as far as possible, be maintained at 3.5 feet above mean sea level, and to do this the lock here proposed would be indispensable, as with the Covelong bar open (maximum rise of tide 2.92 feet above and low water 0.70 below M.S.L.) the water would otherwise escape through the southern canal. The necessity for constructing a dam here is not sufficiently apparent to warrant the work being included in the estimate as yet.

3. *Paragraph 4.*—Under the present arrangements for taking the tolls, the proposed landing place would not help traffic, but Captain Awdry has a proposal for altering the sections so soon as the channel shall be open as far as the Cheyoor backwater, which if combined with a proper opening, headway being given to the South Indian Railway bridge, would permit and encourage traffic through the Junction Canal.

4. *Paragraph 5.*—Appended is a detailed statement of the spans and headways of the bridges, the former being generally under 20 feet each, and the latter as low as 9.22 feet at M.S.L. The headway is thus only 5.72 feet when the level of the water is 3.5 feet above M.S.L., and is therefore much too low. The expense of altering all these bridges, fourteen in number, would be prohibitory for the present, but means should be found by corbeling or otherwise to provide an 18-inch wide board for the towing coolies to pass. To prevent water escaping from the Cooum when the Adyar bar is open, a lock should be built at south end of the Junction Canal. So long as it can be managed without injury to the channel or the bridges a scour may be provided for in order to remove silt.

STATEMENT showing the clear headway and span of Bridges over the Buckingham Canal.

STATEMENT SHOWING THE CLEAR HEADWAY.

Mileage from Basin.	Name of Bridges.	Minimum span at M.S.L. in feet.	Maximum height above M.S.L. in feet.	Remarks.	Height available above M.S.L. for boats	
					With tops 10 feet wide.	With tops 13 feet wide.
M. P.	Bridges north of Cochrane's Basin.					
0 4	Ráyapuram Railway bridge ..	59	10.72	Iron girder bridge ..	10.72	10.72
1 4½	Washermanpettah bridge ..	43	10.00	Masonry segmental arch ..	9.60	9.40
3 6	Theroovattoor bridge ..	43	10.00	Do. do. ..	9.58	9.36

Statement showing the clear headway and span of Bridges over the Buckingham Canal—cont.

Mileage from Basin.	Name of Bridges.	Minimum span at M.S.L. in feet.	Maximum height above M.S.L. in feet.	Remarks.	Height available above M.S.L. for boats	
					With tops 10 feet wide.	With tops 13 feet wide.
M. F.	Bridges south of Basin.					
0 0	Basin bridge	50-00	12-52	Masonry segmental arch ..	12-17	11-94
0 4	Salt Cotaar bridge	29-66	8-64	Wooden bridge	8-64	8-64
0 6½	Elephant Gate bridge	49-00	10-94	Masonry segmental arch ..	10-52	10-28
0 7	Central Station Railway bridge ..	64-00	9-35	Iron girder bridge	9-35	9-35
1 4½	General Hospital bridge	49-00	11-04	Masonry segmental arch ..	10-62	10-38
1 6	South Indian Railway bridge ..	13-91	7-03	Wooden bridge	7-03	7-03
1 6	Saint Mary's bridge	29-00	11-49	Do. metalled	11-49	11-49
2 3	Government House bridge	32-00	10-40	Masonry segmental arch ..	9-74	9-53
3 0	Marine Villa	19-83	10-92	Iron piles rough stone abutments.	10-92	10-92
3 2	Chepauk bridge	19-62	10-92	Masonry segmental arch ..	9-92	9-17
3 6	Pycroft's road bridge	19-62	11-29	Do. do.	10-29	9-54
3 7½	Soonkarammah Street bridge ..	20-17	11-52	Masonry and wooden platform.	11-52	11-52
4 2	Ice House road	19-83	11-68	Masonry segmental arch ..	10-68	9-93
4 6½	Elliot's road	20-17	11-77	Masonry semicircular arch ..	10-44	9-35
5 0	Barber's bridge	27-33	9-71	Masonry and wooden platform.	9-71	9-71
5 3½	Moondacunny Covil road bridge ..	20-00	13-22	Do. do.	13-22	13-22
5 5	Cutcheri road	19-58	10-42	Masonry semicircular arch ..	9-09	8-00
5 5½	Brodie's road bridge	20-17	10-89	Do. do.	9-68	8-77
6 3	Poonthotum aqueduct	20-42	10-05	Masonry wooden platform ..	10-05	10-05
6 3	Yellapatha Mauda Covil road ..	20-25	9-22	Do. do.	9-22	9-22
7 1½	Soolay Cauthoy Syphon	21-83	10-00	Do. do.	10-00	10-00
8 0	Greenaway's bridge	21-00	13-03	Masonry segmental arch, skew ..	12-03	11-03
10 0	Guindy bridge, span excluding tow paths.	45-00	15-42	Masonry elliptical arch ..	15-17	15-09
10 0	Lattice bridge do. do. ..	43-00	12-14	Masonry abutments and wooden structure.	12-14	12-14
42 0	Sadras bridge do. do. ..	43-75	13-83	Masonry elliptical arch ..	13-58	13-50
45 0	Ismalpett bridge do. do. ..	35-00	14-75	Masonry semicircular arch ..	14-38	14-13

* The figures in antique show the Bridges having the least headway.

5. Paragraph 7.—Observations concurred in.

6. Paragraph 8.—A flood-gate which would form no impediment to traffic would answer all purposes.

7. The sewage of all the north portion of Black Town should unquestionably be diverted from discharging into the canal by an intercepting sewer, to be constructed by the Municipality.

8. Paragraph 9.—Agreed.

9. Paragraph 10.—Approved, but the question will require further study. Some of the present lime kilns which occupy the needed ground must be removed.

10. Paragraph 12.—New bridges should be provided for, but the removal of the present structures is not a matter of urgency.

11. Paragraphs 13 and 14.—This lock has not sufficient height to clear it in maximum floods, and is at least half a mile too far north. It will be necessary to remove this lock and take a new isolated channel from 6 M. 6 F. through the ground to the east as far as 9 M. 3 F. where there should be a flood-gate. By these arrangements the canal will be preserved from the effects of the floods of the Kortalayár and of the Red Hill tank drainage, from both of which it now suffers greatly at times.

12. Paragraph 15.—From 11½ to 20½ M. should be taken in a new isolated channel east of the backwater, with flood-gates at either end. The existing deep portion of canal between 17 M. and 19 M. might be included in this new line. Owing to the oozy nature of the bottom in the existing backwater, dredging would have no permanent effect.

13. The opening into the Chintamony backwater will have in any case to be left open for the free passage of flood water. From immediately beyond this point, and to the entrance of the lake beyond the town of Pulicat, careful study is required. So far as can

be judged, however, a feasible plan would seem to consist in making an isolated channel 4½ miles in length along the west margin of the backwater, between 20½ M. and 25 M., with flood-gates at either end.

14. I do not approve of the proposal to bank across the opening at 20½ M., nor to take the canal along the east margin close up to the bar; this would certainly be dangerous for boats during flood.

15. Paragraph 17.—The only apparent means for ensuring a sufficiently protected line along all this portion will be to take a new isolated line, as proposed, along the depression which commences a little north of the Pulicat bar. Some palliatives are feasible, e.g., altering slightly the end of the south cut in the lake so as to carry it into deep water, but there is no radical cure apparently for the admitted difficulties of the present line, which is throughout exposed to the wide expanse of water on the west.

16. The only part of the line which can be considered as adequately protected between Pulicat and Cusbah is the short portion between 35 M. 7 F. and 38 M., and this of course can be taken into the new line.

17. From a peculiarity in the conformation of the Pulicat lake, it appears that, when the waters of excessive floods begin to subside, the canal from a little north of 36 M. acts as a surplus channel. A very beneficial scour is thus found to have been set up throughout the line to its southern debouchure in the lake at 27 M. This peculiarity should be turned to use for the new isolated line by the construction of a powerful head sluice in the west bank at 36 M., and a scour produced in the channel down to the bar whenever circumstances favor. A sluice with five or six openings, 6 feet wide each, would apparently suffice.

18. Whether a flood-gate would be needed at the southern extremity near the Pulicat bar is not as yet clear.

19. Paragraph 22.—From Cusbah, 45 M., northwards a strong west bank, well above flood level, is essential, and the canal should be isolated up to 68 M., where a flood-gate may be placed. An interval will here have to be left for the passage of flood water, and the new cut to the west of the backwater, as suggested by Major Vibart, made up to Dugarápatnam, 69 M. This short portion will also need to be isolated by flood-gates at either end. The proposed basin at Dugarápatnam should, as elsewhere, consist of a simple widening of the channel.

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28. *Paragraphs 37 and 38.*—Banking across the Ramatheertham drainage is inadmissible; it will be essential to cut a new line, of about six furlongs in length, to the west of the present line, so as to avoid getting dangerously close to the bar.

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30. *Paragraph 42.*—The plan suggested of training the river so as to occupy and deepen out its central channel, and further to make a new cut to the west, of about two miles long, through ground 3 or 4 feet above M.S.L., seem essential. Since the cyclone of May 1879 the existing channel through the backwater has changed no less than four times.

31. Flood-gates will be required, one north of the Chippelairoo, at probably 134 M. and another at the 148 M. 2 F.

32. *Paragraph 46.*—The Ramapatam drainage, which enters at 148 M. 3 F. might have its outlet to the sea barred permanently, and the drainage thus taken into the canal utilised with a view to bringing a beneficial scour to bear on the northern portion towards the Elikeru.

33. *Paragraph 47.*—As regards this drainage it will be best to embank across the northern outlet, placing a flood-gate at 151 M. leaving the present southern opening (150 M. 6 F. to 150 M. 7 F.) free to discharge by the open bar.

34. To prevent the silting of the channel south of the Manneru, a flood-gate will be necessary at about 160 M.

35. The spill of the Manneru floods over the left bank of the river must be stopped by an embankment, but the most essential work here, and one which there should be no delay in carrying out, is the deviation of the present channel for about three furlongs in length, as suggested by Major Vibart. Without any cyclone flood in 1878 some three miles of channel here silted up to a depth of over 2 feet with ordinary

freshets, and there can be no question that flood-gates are essential at both the Manneru and Palar ends of this reach of the canal.

36. *Paragraphs 49 and 50.*—Agreed. It is essential that the spill of the Paleru floods over its right bank should be barred by a strong embankment from the north end of the present Pakala bank as far as the canal.

37. *Paragraph 51.*—The short portion of canal, six furlongs in length, between the Moosee and Palar rivers, having silted up in both the May and November cyclones of 1879, barring navigation, some early and effective means must be found for curing the present defects.

38. Hand-dredging alone has not sufficed to allow of a passage being opened for any but boats of very light draft at high tide within two months after the last flood, and even then cargo boats drawing over 1' 9" have had to unload and have the goods carried by hand three-quarters of a mile. For a short time after the November cyclone there was a passage to the east, close to the united bars of the two rivers, but this did not last long. Had powerful steam-dredges been available, and at once set to work, a passage might no doubt have been opened at an earlier date, but at the best it may be assumed that, subsequent to each of the cyclones of last year, this portion of the canal must have been closed to traffic for five or six weeks; it is thus clear that exceptional measures are called for to prevent as far as possible the recurrence of such delays, which if allowed to continue must affect very injuriously the traffic on the canal. Were it feasible to divert one or other river, so as to discharge both streams by a single channel into the sea, the difficulty now experienced would vanish, but as this means cannot I consider be adopted, it appears that the most effective and economical plan will be to excavate a second channel parallel to, and a little west of, the present cut, six furlongs long. This channel, measuring 15 feet in breadth at bottom and carried to 2½ feet below M.S.L., should be excavated as soon as possible. When opened to traffic the existing channel should be closed, cleared and deepened, opened for traffic, and the new subsidiary canal closed by temporary banks and prepared to receive the traffic after the next flood. By thus working alternately on two channels alongside of each other a feasible palliative for the existing difficulties will at least be provided. No west bank will be needed for the new channel, all spoil going to form a high strong bank for the existing cut so as to insure its isolation. Flood-gates at each extremity of the latter will also be needed, if not indeed for both channels.

39. *Paragraph 57.*—The preservation and management of the stretch of canal from one mile north of the Moosee bar (about 170 M.) to the Gundlakamma river depends on the treatment of the spill of the former river during flood over its left bank. Whether it be feasible to train the river by means of a left embankment, starting from a point near the village of Tirupā Nayadipalum, and thus force the whole floods through the present bar, is not clear, but the subject should receive attention.

40. For the present, immediate relief will be given by cutting away entirely the banks which were injudiciously thrown across the Tondairoo creek at 177 M. 2 F. and again at 177 M. 6 F. The effect of any further flood will be to bring a beneficial scour to bear on the whole length of the channel northward, towards the Gundlakamma.

41. Should, however, the training bank for the left bank of the Moosee river as suggested prove feasible, it would in that case probably be desirable to cut a fresh channel for the canal in the four furlongs a little to the east, so as to keep clear of the Tondairoo creek as proposed by Major Vibart. There should be a flood-gate at the end of the canal as it enters the Moosee river.

42. *Paragraphs 57 and 58.*—The basin at Kottapatam may, as suggested, consist of nothing more than an enlargement of the channel to the east and north of the present bridge. This latter, though shaken by the November cyclone, is now sufficiently secure to last with repairs for some years, and though boats in passing it have to lower their masts, there is no serious inconvenience, as they invariably halt at the place.

43. The road dam immediately west of the bridge must be removed (as being much too close to the canal) to a point on the Ongole road 300 yards further west; and be

there reconstructed 100 yards in length, lowest point of invert being 1 foot above H.W.L. The materials of the present dam will nearly suffice for the new, and the same style of tail apron should be employed. The western embankment of the canal (south of the bridge) should be much strengthened, and the road well raised over the site of the present dam, so as effectually to prevent any future invasion by flood water. The laterite bridge, which with its nine elliptical arches of 18 feet span carries off all the residue of the Tondairoo drainage not vented by the canal, should be thoroughly repaired as its flooring is still sound. The unworkman-like additions made on either side of the arches to bear the parapets, and which were much injured by the November flood, must be removed and the roadway reduced to about $9\frac{1}{2}$ feet in width. The removal and reconstruction of the road dam above adverted to must be charged to the canal, but the alterations of the bridge ought to devolve on the Local Fund Board, who may also fairly undertake the construction of the proposed Moosafirkhana at Utapotu.

44. *Paragraphs 59, 60, 61.*—Northward from Kottapatnam (179 to 187 M.) the banks originally low have suffered severely during the November cyclone, first by the action of the storm wave from the east, there being no protecting "dunes" here, and second, from the land flood which supervened. But notwithstanding this destruction of the banks the channel has been, if any thing, improved owing to the fact that the surplus of the Moosee river flood vented itself through the Tondairoo creek, and finding its way into the canal scoured it throughout and cleared it of silt. Practically, therefore, little work is required in this reach. In a few places a strong, well planted, east bank will be needed to counteract the action of a storm wave; but on the west the less obstruction presented to the land flood the better, unless at some future time the expense of a sufficiently high and strong isolating west bank be considered essential. As matters stand, levelling down the bank as much as possible and bringing the tow-path into order is all that need be thought of. No vegetation seems to thrive here owing to the salt dust carried by the west winds which smothers and kills even the "woolsa" rush and the salt plant "eela," both of which thrive elsewhere. So long as the channel is not isolated no flood-gate is necessary at the Gundlakamma.

45. *Paragraph 62.*—The crossing of the Gundlakamma river calls for no special remark.

46. *Paragraph 63.*—As regards the proposals in this paragraph I have seen reason for the present at least to prefer flood-gates nearly everywhere to locks, the grounds for which will be found elsewhere.

47. *Paragraph 64.*—For five miles north of the Gundlakamma river the canal is exposed to serious wash, particularly at two places where bars opened in the November cyclone, and which must therefore be left free of any obstruction. To all appearances, however, the spill water from the Gundlakamma might, as suggested by Sub-Engineer Ottmann, be effectually checked by constructing a strong training bank along the left bank of the river, two or three miles in length, and diverting the drainage from the Kanuparti swamp. The alternative to this plan would be to construct a strong west bank all along the canal. In addition to protection on the west, a well-planted east bank is also needed at two places, but only for short lengths. Major Vibart has suggested an entirely new channel between $199\frac{1}{2}$ and $191\frac{1}{2}$ M. but as the object here must be to get sufficiently inland from the Kanuparti bar, to which the present line is dangerously near, it will suffice to make the new cut to the westward of only three furlongs in length at a distance of 200 yards from the existing channel.

48. *Paragraphs 66, 67, 68.*—Little remark called for. It may be doubted whether the position of the new lock at Feringy Dibba has been judiciously selected, and whether, looking to the great drainage which sweeps over the whole country south of Santaravoor, it would not have been safer to have given another flight to this latter lock, and dropped the canal thus direct into the Rompairoo drainage. It is now however too late to suggest any alteration of the arrangements here.

49. *Paragraph 69.*—The reasoning here employed by Major Vibart in favor of isolating the different reaches of the canal which intervene between drainages that cannot safely, particularly during flood, be barred in the passage to the sea, derives additional force from the effects of the November cyclone which followed on the

one which occurred in May and which is the subject of his report. But there is such a strong and, it must be admitted, well-founded objection to the delays inseparable from locks, added to the great expense of first construction and subsequent working, a regular establishment being necessary for each all the year round, that I have proposed for the present at least to construct flood-gates at the end of each reach. These would only be closed on extreme occasions to exclude silt and flood from the channel. They would be comparatively cheap in construction, could be made portions of locks at any future time should such be considered requisite, would in no way interfere with or delay traffic, and need only have a small establishment to look after them in the cyclone or flood period. Inlet weirs I also see no immediate necessity for, but the depth of the canal and even its section may now with advantage be much diminished to meet actual requirements. These and other subjects will however be discussed in a separate paper.

50. *Paragraph 70.*—The training of the several large drainages, and the necessity for a special study of each case, has been sufficiently pointed out in the above remarks, but here, as elsewhere, Major Vibart seems to favor the use of inlets and outlets of masonry for the disposal of minor drainages. I very much question the applicability of works of this character to the canal, as in hardly any case is there means of securing a proper outfall for the water on the down or eastern side of the channel. There may however be a few cases in which the principle might be accepted, and where this is the case the plan might be tried, adding however a capacious silt trap on the upper or west side of the canal. This should be kept always clear. It seems to me that all drainages which cannot be effectually shut out and diverted into other lines must of necessity be allowed free vent at a level across the canal, and that everything in the shape of an obstruction would be a mistake.

CHEPAUK,
10th April 1880.

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Appendix to G.O., No. 281 W., of 6th February 1880.

OBSERVATIONS BY THE CHIEF ENGINEER ON MAJOR VIBART'S BUCKINGHAM CANAL INSPECTION NOTES DATED 27TH SEPTEMBER 1879.

Paragraph 1.—The requisite survey establishment has been sanctioned, and the Superintendent of Works, Captain Awdry, is engaged in preparing the estimate for submission to the Government of India. Tide gauges have been established in all backwaters and open estuaries, as also at intermediate points along the canal.

2. Paragraph 3.—For sanitary purposes it is most desirable that the level of the water in the Coom and Adyar rivers should, as far as possible, be maintained at 3.5 feet above mean sea level, and to do this the lock here proposed would be indispensable, as with the Covelong bar open (maximum rise of tide 2.92 feet above and low water 0.70 below M.S.L.) the water would otherwise escape through the southern canal. The necessity for constructing a dam here is not sufficiently apparent to warrant the work being included in the estimate as yet.

3. Paragraph 4.—Under the present arrangements for taking the tolls, the proposed landing place would not help traffic, but Captain Awdry has a proposal for altering the sections so soon as the channel shall be open as far as the Cheyoor backwater, which if combined with a proper opening, headway being given to the South Indian Railway bridge, would permit and encourage traffic through the Junction Canal.

4. Paragraph 5.—Appended is a detailed statement of the spans and headways of the bridges, the former being generally under 20 feet each, and the latter as low as 9.22 feet at M.S.L. The headway is thus only 5.72 feet when the level of the water is 3.5 feet above M.S.L., and is therefore much too low. The expense of altering all these bridges, fourteen in number, would be prohibitory for the present, but means should be found by corbeling or otherwise to provide an 18-inch wide board for the towing coolies to pass. To prevent water escaping from the Coom when the Adyar bar is open, a lock should be built at south end of the Junction Canal. So long as it can be managed without injury to the channel or the bridges a scour may be provided for in order to remove silt.

STATEMENT showing the clear headway and span of Bridges over the Buckingham Canal.

Mileage from Basin.	Name of Bridges.	Minimum span at M.S.L. in feet.	Maximum height above M.S.L. in feet.	Remarks.	Height available above M.S.L. for boats	
					With tops 10 feet wide.	With tops 13 feet wide.
M. F.	Bridges north of Cochrane's Basin.					
0 4	Ráyapuram Railway bridge ..	59	10.72	Iron girder bridge ..	10.72	10.72
1 4½	Washermanpettah bridge ..	43	10.00	Masonry segmental arch ..	9.60	9.40
3 6	Theroovattoor bridge ..	43	10.00	Do. do. ..	9.58	9.36

Statement showing the clear headway and span of Bridges over the Buckingham Canal—cont.

Milage from Basin.	Name of Bridges.	Minimum span at M.S.L. in feet.	Maximum height above M.S.L. in feet.	Remarks.	Height available above M.S.L. for boats	
					With tops 10 feet wide.	With tops 13 feet wide.
M. F.	Bridges south of Basin.					
0 0	Basin bridge	50-00	12-52	Masonry segmental arch ..	12-17	11-94
0 4	Salt Cota bridge	29-66	*8-64	Wooden bridge	8-64	8-64
0 6½	Elephant Gate bridge ..	49-00	10-94	Masonry segmental arch ..	10-52	10-28
0 7	Central Station Railway bridge ..	64-00	9-35	Iron girder bridge	9-35	9-35
1 4½	General Hospital bridge ..	49-00	11-04	Masonry segmental arch ..	10-62	10-38
1 6	South Indian Railway bridge ..	49-00	7-03	Wooden bridge	7-03	7-03
1 6	Saint Mary's bridge	13-91	11-49	Do. metalled	11-49	11-49
2 3	Government House bridge ..	29-00	10-40	Masonry segmental arch ..	9-74	9-53
3 0	Marine Villa	32-00	10-92	Iron piles rough stone abutments.	10-92	10-92
3 2	Chepauk bridge	19-83	10-92	Masonry segmental arch ..	9-92	9-17
3 6	Pycroft's road bridge	19-62	11-29	Do. do.	10-29	9-54
3 7½	Soonkarammah Street bridge ..	19-62	11-52	Masonry and wooden platform.	11-52	11-52
4 2	Ice House road	20-17	11-68	Masonry segmental arch ..	11-68	9-93
4 6½	Elliott's road	19-83	11-77	Masonry semicircular arch ..	10-44	9-35
5 0	Barber's bridge	20-17	9-71	Masonry and wooden platform.	9-71	9-71
5 3½	Moondacunny Covil road bridge ..	27-33	13-22	Do. do.	13-22	13-22
5 5	Cutcherry road	20-00	10-42	Masonry semicircular arch ..	9-09	8-00
5 5½	Brodie's road bridge	19-58	10-42	Do. do.	9-68	8-77
6 3	Poonthotum aqueduct	20-17	10-89	Do. do.	10-05	10-05
6 3	Yellapatha Mauda Covil road ..	20-42	10-05	Masonry wooden platform ..	9-22	9-22
7 1½	Soolay Cauthoy Syphon	20-25	9-22	Do. do.	10-00	10-00
8 0	Greenaway's bridge	21-83	10-00	Do. do.	12-03	11-03
10 0	Guindy bridge, span excluding tow paths.	21-00	13-03	Masonry segmental arch, skew ..	15-17	15-09
42 0	Lattice bridge do. do. ..	45-00	15-42	Masonry elliptical arch ..		
45 0	Sadras bridge do. do. ..	43-00	12-14	Masonry abutments and wooden structure.	12-14	12-14
	Ismalpett bridge do. do. ..	43-75	13-83	Masonry elliptical arch ..	13-58	13-50
		35-00	14-75	Masonry semicircular arch ..	14-38	14-13

* The figures in antique show the Bridges having the least headway.

5. Paragraph 7.—Observations concurred in.

6. Paragraph 8.—A flood-gate which would form no impediment to traffic would answer all purposes.

7. The sewage of all the north portion of Black Town should unquestionably be diverted from discharging into the canal by an intercepting sewer, to be constructed by the Municipality.

8. Paragraph 9.—Agreed.

9. Paragraph 10.—Approved, but the question will require further study. Some of the present lime kilns which occupy the needed ground must be removed.

10. Paragraph 12.—New bridges should be provided for, but the removal of the present structures is not a matter of urgency.

11. Paragraphs 13 and 14.—This lock has not sufficient height to clear it in maximum floods, and is at least half a mile too far north. It will be necessary to remove this lock and take a new isolated channel from 6 M. 6 F. through the ground to the east as far as 9 M. 3 F. where there should be a flood-gate. By these arrangements the canal will be preserved from the effects of the floods of the Kortalayár and of the Red Hill tank drainage, from both of which it now suffers greatly at times.

12. Paragraph 15.—From 11½ to 20½ M. should be taken in a new isolated channel east of the backwater, with flood-gates at either end. The existing deep portion of canal between 17 M. and 19 M. might be included in this new line. Owing to the oozy nature of the bottom in the existing backwater, dredging would have no permanent effect.

13. The opening into the Chintamony backwater will have in any case to be left open for the free passage of flood water. From immediately beyond this point, and to the entrance of the lake beyond the town of Pulicat, careful study is required. So far as can

be judged, however, a feasible plan would seem to consist in making an isolated channel 4½ miles in length along the west margin of the backwater, between 20½ M. and 25 M., with flood-gates at either end.

14. I do not approve of the proposal to bank across the opening at 20½ M., nor to take the canal along the east margin close up to the bar; this would certainly be dangerous for boats during flood.

15. Paragraph 17.—The only apparent means for ensuring a sufficiently protected line along all this portion will be to take a new isolated line, as proposed, along the depression which commences a little north of the Pulicat bar. Some palliatives are feasible, e.g., altering slightly the end of the south cut in the lake so as to carry it into deep water, but there is no radical cure apparently for the admitted difficulties of the present line, which is throughout exposed to the wide expanse of water on the west.

16. The only part of the line which can be considered as adequately protected between Pulicat and Cusbah is the short portion between 35 M. 7 F. and 38 M., and this of course can be taken into the new line.

17. From a peculiarity in the conformation of the Pulicat lake, it appears that, when the waters of excessive floods begin to subside, the canal from a little north of 36 M. acts as a surplus channel. A very beneficial scour is thus found to have been set up throughout the line to its southern debouchure in the lake at 27 M. This peculiarity should be turned to use for the new isolated line by the construction of a powerful head sluice in the west bank at 36 M., and a scour produced in the channel down to the bar whenever circumstances favor. A sluice with five or six openings, 6 feet wide each, would apparently suffice.

18. Whether a flood-gate would be needed at the southern extremity near the Pulicat bar is not as yet clear.

19. Paragraph 22.—From Cusbah, 45 M., northwards a strong west bank, well above flood level, is essential, and the canal should be isolated up to 68 M., where a flood-gate may be placed. An interval will here have to be left for the passage of flood water, and the new cut to the west of the backwater, as suggested by Major Vibart, made up to Dugarápatnam, 69 M. This short portion will also need to be isolated by flood-gates at either end. The proposed basin at Dugarápatnam should, as elsewhere, consist of a simple widening of the channel.

20. Paragraph 24.—If on further inquiry the drainage which enters at 71 M. 5 F. cannot safely be barred from entering the canal, a flood-gate must be placed a little north. I do not consider a sluice weir, as proposed here, to be suitable. Another flood-gate will be needed a little south of the Swarnamukhi river. This reach of canal, 4 miles in length, will thus, with the embankments proposed, be thoroughly isolated in case of flood.

21. Paragraph 25.—The crossing of the Swarnamukhi river is a complicated matter, and calls for further examination. So far as can be judged, Major Vibart's proposed deviation from a point near the village of Govindapulli to Mullapulli, combined with training the river by means of embankments and strongly constructed cross bunds east and west, appears to hold out the best solution.

22. Paragraph 27.—No remark called for further than that at either extremity of these 14 miles of canal flood-gates might with advantage be placed. It does not appear essential to make so long a deviation, (1 mile in length,) as proposed here by Major Vibart. If the present end of the channel as it enters the Kundalairoo river is turned east and north for about 2 furlongs, and made to enter the backwater close to the west of the Gungapalliem village, it will answer all purposes, as the backwater is believed to remain permanently deep at this point.

23. Paragraph 30.—The Kistnapatam basin must be extended as proposed. A flood-gate will be required south of the basin, and as regards the canal to the north, the banks must be raised and the channel isolated.

24. Paragraph 31.—At Nellatoor it will be necessary to cut a fresh channel for nearly two miles (95 M. 4 F. to 97 M. 6 F.) a little east of the present line in rather higher ground, thus leaving the present channel free for the passage of drainage.

25. *Paragraph 32.*—The whole of the drainage here must be collected and passed across the channel at one point.

26. *Paragraph 33.*—Here again, of the three openings the central one must be kept clear for the passage of the drainage, closing the others.

27. *Paragraph 34.*—The Pennér river (114 M. 3 F. to 116 M. 6 F.) crossing is probably the most difficult matter to deal with in the length of the canal. Some Rs. 11,000 were spent in taking the silt out of the cut here (115 M. 4 F. and 116 M. 3 F.) within the first year of opening the canal, and in both the cyclones of 1879 not only has the same cut again silted up to within 9 inches of L.W.L., but the several branches of the river, five in number, show such a tendency to change their course that it has become a serious matter for consideration as to how the canal can here be kept open for traffic. Even were steam-dredges available, the canal would still be closed after each ordinary fresh in the river to all but top-boats and others of very light draft taking advantage of high tide, and the stoppage would be absolute after a cyclone flood of any intensity. No mere palliatives will therefore answer here, and my conviction is that the best and, in the end, by far the most economical course will be to train the Pennér in such a way from the head of its delta that the discharge shall take place entirely through its southernmost channel, closing all the others. This can be done by training the river from a point near the village of Utakoor, about three miles west of the canal, on the left bank. At the same time, groynes should be so constructed on the right bank, a little north of Kuddipalem, that the present line of river bank and the flood embankment within it shall be preserved from invasion. The left embankment would probably extend from Utakoor to the destroyed village of Palipalem. By this means not only would a sufficiently deep channel be always preserved in the southern branch of the river, but by closing the canal ends north and south with flood-gates, these would be preserved from the silting which now causes the difficulty. I do not consider that there should be any serious difficulty in training the Pennér as proposed, but further careful study of all the features is necessary.

28. *Paragraphs 37 and 38.*—Banking across the Ramatheertham drainage is inadmissible; it will be essential to cut a new line, of about six furlongs in length, to the west of the present line, so as to avoid getting dangerously close to the bar.

29. *Paragraphs 39 and 40.*—As with the Ramatheertham so with the Pydaru (123 M. 6 F.) and the Eskapally (126 M.) drainages, free vent must be allowed across the line of canal, but a strong west bank to keep out floods should be constructed. Whether it will be necessary eventually to isolate each of these portions with flood-gates (that at 117 M. is essential) cannot however be decided with certainty.

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36. *Paragraphs 49 and 50.*—Agreed. It is essential that the spill of the Palaru floods over its right bank should be barred by a strong embankment from the north end of the present Pakala bank as far as the canal.

37. *Paragraph 51.*—The short portion of canal, six furlongs in length, between the Moosce and Palar rivers, having silted up in both the May and November cyclones of 1879, barring navigation, some early and effective means must be found for curing the present defects.

38. Hand-dredging alone has not sufficed to allow of a passage being opened for any but boats of very light draft at high tide within two months after the last flood, and even then cargo boats drawing over 1' 9" have had to unload and have the goods carried by hand three-quarters of a mile. For a short time after the November cyclone there was a passage to the east, close to the united bars of the two rivers, but this did not last long. Had powerful steam-dredges been available, and at once set to work, a passage might no doubt have been opened at an earlier date, but at the best it may be assumed that, subsequent to each of the cyclones of last year, this portion of the canal must have been closed for to prevent as far as possible the recurrence of such exceptional measures are called for to continue must affect very injuriously the traffic on the delays, which if allowed to divert one or other river, so as to discharge both streams by a single channel into the sea, the difficulty now experienced would vanish, but as this means cannot I consider be adopted, it appears that the most effective and economical plan will be to excavate a second channel parallel to, and a little west of, the present cut, six furlongs long. This channel, measuring 15 feet in breadth at bottom and carried to 2½ feet below M.S.L., should be excavated as soon as possible. When opened to traffic the existing canal should be closed, cleared and deepened, prepared to receive the traffic after the next flood. By thus working alternately on two channels alongside of each other a feasible palliative for the existing difficulties will at least be provided. No west bank will be needed for the new channel, all spoil going to form a high strong bank for the existing cut so as to insure its isolation. Flood-gates at each extremity of the latter will also be needed, if not indeed for both channels.

39. *Paragraph 57.*—The preservation and management of the stretch of canal from one mile north of the Moosce bar (about 170 M.) to the Gundlakamma river depends on the treatment of the spill of the former river by means of a left embankment, bank. Whether it be feasible to train the river by means of a left embankment, starting from a point near the village of Tirupu Nayadipalum, and thus force the whole floods through the present bar, is not clear, but the subject should receive attention.

40. For the present, immediate relief will be given by cutting away entirely the banks which were injudiciously thrown across the Tondairoo creek at 177 M. 2 F. and again at 177 M. 6 F. The effect of any further flood will be to bring a beneficial scour to bear on the whole length of the channel northward, towards the Gundlakamma.

41. Should, however, the training bank for the left bank of the Moosce river as suggested prove feasible, it would in that case probably be desirable to cut a fresh channel for the canal as it enters the four furlongs a little to the east, so as to keep clear of the Tondairoo creek as proposed by Major Vibart. There should be a flood-gate at the end of the canal as it enters the Moosce river.

42. *Paragraphs 57 and 58.*—The basin at Kottapatam may, as suggested, consist of nothing more than an enlargement of the channel to the east and north of the present bridge. This latter, though shaken by the November cyclone, is now sufficiently secure to last with repairs for some years, and though boats in passing it have to lower their masts, there is no serious inconvenience, as they invariably halt at the place.

43. The road dam immediately west of the bridge must be removed (as being much too close to the canal) to a point on the Ongole road 300 yards further west; and be

there reconstructed 100 yards in length, lowest point of invert being 1 foot above H.W.L. The materials of the present dam will nearly suffice for the new, and the same style of tail apron should be employed. The western embankment of the canal (south of the bridge) should be much strengthened, and the road well raised over the site of the present dam, so as effectually to prevent any future invasion by flood water. The laterite bridge, which with its nine elliptical arches of 18 feet span carries off all the residue of the Tondairoo drainage not vented by the canal, should be thoroughly repaired as its flooring is still sound. The unworkman-like additions made on either side of the arches to bear the parapets, and which were much injured by the November flood, must be removed and the roadway reduced to about $9\frac{1}{2}$ feet in width. The removal and reconstruction of the road dam above adverted to must be charged to the canal, but the alterations of the bridge ought to devolve on the Local Fund Board, who may also fairly undertake the construction of the proposed Moosafirkhana at Utapotu.

44. *Paragraphs 59, 60, 61.*—Northward from Kottapatnam (179 to 187 M.) the banks originally low have suffered severely during the November cyclone, first by the action of the storm wave from the east, there being no protecting "dunes" here, and second, from the land flood which supervened. But notwithstanding this destruction of the banks the channel has been, if any thing, improved owing to the fact that the surplus of the Moosee river flood vented itself through the Tondairoo creek, and finding its way into the canal scoured it throughout and cleared it of silt. Practically, therefore, little work is required in this reach. In a few places a strong, well planted, east bank will be needed to counteract the action of a storm wave; but on the west the less obstruction presented to the land flood the better, unless at some future time the expense of a sufficiently high and strong isolating west bank be considered essential. As matters stand, levelling down the bank as much as possible and bringing the tow-path into order is all that need be thought of. No vegetation seems to thrive here owing to the salt dust carried by the west winds which smothers and kills even the "woolsa" rush and the salt plant "eela," both of which thrive elsewhere. So long as the channel is not isolated no flood-gate is necessary at the Gundlakamma.

45. *Paragraph 62.*—The crossing of the Gundlakamma river calls for no special remark.

46. *Paragraph 63.*—As regards the proposals in this paragraph I have seen reason for the present at least to prefer flood-gates nearly everywhere to locks, the grounds for which will be found elsewhere.

47. *Paragraph 64.*—For five miles north of the Gundlakamma river the canal is exposed to serious wash, particularly at two places where bars opened in the November cyclone, and which must therefore be left free of any obstruction. To all appearances, however, the spill water from the Gundlakamma might, as suggested by Sub-Engineer Ottmann, be effectually checked by constructing a strong training bank along the left bank of the river, two or three miles in length, and diverting the drainage from the Kanuparti swamp. The alternative to this plan would be to construct a strong west bank all along the canal. In addition to protection on the west, a well-planted east bank is also needed at two places, but only for short lengths. Major Vibart has suggested an entirely new channel between ~~190 $\frac{1}{2}$~~ and ~~191 $\frac{1}{2}$~~ M. ^{191 $\frac{1}{2}$ and 192} but as the object here must be to get sufficiently inland from the Kanuparti bar, to which the present line is dangerously near, it will suffice to make the new cut to the westward of only three furlongs in length at a distance of 200 yards from the existing channel.

48. *Paragraphs 66, 67, 68.*—Little remark called for. It may be doubted whether the position of the new lock at Feringy Dibba has been judiciously selected, and whether, looking to the great drainage which sweeps over the whole country south of Santaravoor, it would not have been safer to have given another flight to this latter lock, and dropped the canal thus direct into the Rompairoo drainage. It is now however too late to suggest any alteration of the arrangements here.

49. *Paragraph 69.*—The reasoning here employed by Major Vibart in favor of isolating the different reaches of the canal which intervene between drainages that cannot safely, particularly during flood, be barred in the passage to the sea, derives additional force from the effects of the November cyclone which followed on the

one which occurred in May and which is the subject of his report. But there is such a strong and, it must be admitted, well-founded objection to the delays inseparable from locks, added to the great expense of first construction and subsequent working, a regular establishment being necessary for each all the year round, that I have proposed for the present at least to construct flood-gates at the end of each reach. These would only be closed on extreme occasions to exclude silt and flood from the channel. They would be comparatively cheap in construction, could be made portions of locks at any future time should such be considered requisite, would in no way interfere with or delay traffic, and need only have a small establishment to look after them in the cyclone or flood period. Inlet weirs I also see no immediate necessity for, but the depth of the canal and even its section may now with advantage be much diminished to meet actual requirements. These and other subjects will however be discussed in a separate paper.

50. *Paragraph 70.*—The training of the several large drainages, and the necessity for a special study of each case, has been sufficiently pointed out in the above remarks, but here, as elsewhere, Major Vibart seems to favor the use of inlets and outlets of masonry for the disposal of minor drainages. I very much question the applicability of works of this character to the canal, as in hardly any case is there means of securing a proper outfall for the water on the down or eastern side of the channel. There may however be a few cases in which the principle might be accepted, and where this is the case the plan might be tried, adding however a capacious silt trap on the upper or west side of the canal. This should be kept always clear. It seems to me that all drainages which cannot be effectually shut out and diverted into other lines must of necessity be allowed free vent at a level across the canal, and that everything in the shape of an obstruction would be a mistake.

R. H. SANKEY, Colonel, R.E.,
Chief Engineer.

CHEPAUK,
10th April 1880.

Appendix to G.O., No. 284 W., of 6th February 1880.

OBSERVATIONS BY THE CHIEF ENGINEER ON MAJOR VIBART'S BUCKINGHAM CANAL INSPECTION NOTES DATED 27TH SEPTEMBER 1879.

Paragraph 1.—The requisite survey establishment has been sanctioned, and the Superintendent of Works, Captain Awdry, is engaged in preparing the estimate for submission to the Government of India. Tide gauges have been established in all backwaters and open estuaries, as also at intermediate points along the canal.

2. Paragraph 3.—For sanitary purposes it is most desirable that the level of the water in the Cooum and Adyar rivers should, as far as possible, be maintained at 3.5 feet above mean sea level, and to do this the lock here proposed would be indispensable, as with the Covelong bar open (maximum rise of tide 2.92 feet above and low water 0.70 below M.S.L.) the water would otherwise escape through the southern canal. The necessity for constructing a dam here is not sufficiently apparent to warrant the work being included in the estimate as yet.

3. Paragraph 4.—Under the present arrangements for taking the tolls, the proposed landing place would not help traffic, but Captain Awdry has a proposal for altering the sections so soon as the channel shall be open as far as the Cheyoor backwater, which if combined with a proper opening, headway being given to the South Indian Railway bridge, would permit and encourage traffic through the Junction Canal.

4. Paragraph 5.—Appended is a detailed statement of the spans and headways of the bridges, the former being generally under 20 feet each, and the latter as low as 9.22 feet at M.S.L. The headway is thus only 5.72 feet when the level of the water is 3.5 feet above M.S.L., and is therefore much too low. The expense of altering all these bridges, fourteen in number, would be prohibitory for the present, but means should be found by corbeling or otherwise to provide an 18-inch wide board for the towing coolies to pass. To prevent water escaping from the Cooum when the Adyar bar is open, a lock should be built at south end of the Junction Canal. So long as it can be managed without injury to the channel or the bridges a scour may be provided for in order to remove silt.

STATEMENT showing the clear headway and span of Bridges over the Buckingham Canal.

Mileage from Basin.	Name of Bridges.	Minimum span at M.S.L. in feet.	Maximum height above M.S.L. in feet.	Remarks.	Height available above M.S.L. for boats	
					With tops 10 feet wide.	With tops 13 feet wide.
M. F.	Bridges north of Cochrane's Basin.					
0 4	Ráyapuram Railway bridge ..	59	10.72	Iron girder bridge ..	10.72	10.72
1 4½	Washermanpettah bridge ..	43	10.00	Masonry segmental arch ..	9.60	9.40
3 6	Theroovattoor bridge ..	43	10.00	Do. do. ..	9.58	9.36

Statement showing the clear headway and span of Bridges over the Buckingham Canal—cont.

Milage from Basin.	Name of Bridges.	Minimum span at M.S.L. in feet.	Maximum height above M.S.L. in feet.	Remarks.	Height available above M.S.L. for boats	
					With tops 10 feet wide.	With tops 13 feet wide.
Bridges south of Basin.						
0 0	Basin bridge ..				12-17	11-94
0 4	Salt Cota bridge ..	50-00	12-52	Masonry segmental arch ..	8-64	8-64
0 6½	Elephant Gate bridge ..	29-66	8-64	Wooden bridge ..	10-52	10-28
0 7	Central Station Railway bridge ..	49-00	10-94	Masonry segmental arch ..	9-35	9-35
1 4½	General Hospital bridge ..	64-00	9-35	Iron girder bridge ..	10-62	10-38
..	South Indian Railway bridge ..	49-00	11-04	Masonry segmental arch ..	7-03	7-03
1 6	Saint Mary's bridge ..	13-91	7-03	Wooden bridge ..	11-49	11-49
2 3	Government House bridge ..	29-00	11-49	Do. metalled ..	9-74	9-53
3 0	Marine Villa ..	32 00	10-40	Masonry segmental arch ..	10-92	10-92
3 2	Chepauk bridge ..	19-83	10-92	Iron piles rough stone abutments.	9-92	9-17
3 6	Pycroft's road bridge ..	19 62	10-92	Masonry segmental arch ..	10-29	9-54
3 7½	Soonkarammah Street bridge ..	19-62	11-29	Do. do. ..	11-52	11-52
4 2	Ice House road ..	20-17	11-52	Masonry and wooden platform.	10-68	9-93
4 6½	Elliott's road ..	19-83	11-68	Masonry segmental arch ..	10-44	9-35
5 0	Barber's bridge ..	20-17	11-77	Masonry semicircular arch ..	9-71	9-71
5 3½	Moondacunny Covil road bridge ..	27-33	9-71	Masonry and wooden platform.	13-22	13-22
5 5	Cutcherry road ..	20-00	13-22	Do. do. ..	9-09	8-00
5 5½	Brodie's road bridge ..	19-58	10-42	Masonry semicircular arch ..	9-68	8-77
6 3	Poonthotum aqueduct ..	20-17	10-89	Do. do. ..	10-05	10-05
6 3½	Yellapatha Mauda Covil road ..	20-42	10-05	Masonry wooden platform ..	9-22	9-22
7 1½	Soolay Cauthoy Syphon ..	20-25	9-22	Do. do. ..	10-00	10-00
8 0	Greenaway's bridge ..	21-83	10-00	Do. do. ..	12-03	11-03
..	Guindy bridge, span excluding tow paths.	21-00	13-03	Masonry segmental arch, skew ..	15-17	15-09
10 0	Lattice bridge do. do.	45-00	15-42	Masonry elliptical arch ..		
42 0	Sadras bridge do. do.	43-00	12-14	Masonry abutments and wooden structure.	12-14	12-14
45 0	Ismalpett bridge do. do.	43-75	13-83	Masonry elliptical arch ..	13-58	13-50
..		35-00	14-75	Masonry semicircular arch ..	14-38	14-13

* The figures in antique show the Bridges having the least headway.

5. Paragraph 7.—Observations concurred in.
6. Paragraph 8.—A flood-gate which would form no impediment to traffic would answer all purposes.
7. The sewage of all the north portion of Black Town should unquestionably be diverted from discharging into the canal by an intercepting sewer, to be constructed by the Municipality.
8. Paragraph 9.—Agreed.
9. Paragraph 10.—Approved, but the question will require further study. Some of the present lime kilns which occupy the needed ground must be removed.
10. Paragraph 12.—New bridges should be provided for, but the removal of the present structures is not a matter of urgency.
11. Paragraphs 13 and 14.—This lock has not sufficient height to clear it in maximum floods, and is at least half a mile too far north. It will be necessary to remove this lock and take a new isolated channel from 6 M. 6 F. through the ground to the east as far as 9 M. 3 F. where there should be a flood-gate. By these arrangements the canal will be preserved from the effects of the floods of the Kortalayár and of the Red Hill tank drainage, from both of which it now suffers greatly at times.
12. Paragraph 15.—From 11½ to 20½ M. should be taken in a new isolated channel east of the backwater, with flood-gates at either end. The existing deep portion of canal between 17 M. and 19 M. might be included in this new line. Owing to the oozy nature of the bottom in the existing backwater, dredging would have no permanent effect.
13. The opening into the Chintamony backwater will have in any case to be left open for the free passage of flood water. From immediately beyond this point, and to the entrance of the lake beyond the town of Pulicat, careful study is required. So far as can

be judged, however, a feasible plan would seem to consist in making an isolated channel 4½ miles in length along the west margin of the backwater, between 20½ M. and 25 M., with flood-gates at either end.

14. I do not approve of the proposal to bank across the opening at 20½ M., nor to take the canal along the east margin close up to the bar; this would certainly be dangerous for boats during flood.

15. Paragraph 17.—The only apparent means for ensuring a sufficiently protected line along all this portion will be to take a new isolated line, as proposed, along the depression which commences a little north of the Pulicat bar. Some palliatives are feasible, e.g., altering slightly the end of the south cut in the lake so as to carry it into deep water, but there is no radical cure apparently for the admitted difficulties of the present line, which is throughout exposed to the wide expanse of water on the west.

16. The only part of the line which can be considered as adequately protected between Pulicat and Cusbah is the short portion between 35 M. 7 F. and 38 M., and this of course can be taken into the new line.

17. From a peculiarity in the conformation of the Pulicat lake, it appears that, when the waters of excessive floods begin to subside, the canal from a little north of 36 M. acts as a surplus channel. A very beneficial scour is thus found to have been set up throughout the line to its southern debouchure in the lake at 27 M. This peculiarity should be turned to use for the new isolated line by the construction of a powerful head sluice in the west bank at 36 M., and a scour produced in the channel down to the bar whenever circumstances favor. A sluice with five or six openings, 6 feet wide each, would apparently suffice.

18. Whether a flood-gate would be needed at the southern extremity near the Pulicat bar is not as yet clear.

19. Paragraph 22.—From Cusbah, 45 M., northwards a strong west bank, well above flood level, is essential, and the canal should be isolated up to 63 M., where a flood-gate may be placed. An interval will here have to be left for the passage of flood water, and the new cut to the west of the backwater, as suggested by Major Vibart, made up to Dugarápatnam, 69 M. This short portion will also need to be isolated by flood-gates at either end. The proposed basin at Dugarápatnam should, as elsewhere, consist of a simple widening of the channel.

20. Paragraph 24.—If on further inquiry the drainage which enters at 71 M. 5 F. cannot safely be barred from entering the canal, a flood-gate must be placed a little north. I do not consider a sluice weir, as proposed here, to be suitable. Another flood-gate will be needed a little south of the Swarnamukhi river. This reach of canal, 4 miles in length, will thus, with the embankments proposed, be thoroughly isolated in case of flood.

21. Paragraph 25.—The crossing of the Swarnamukhi river is a complicated matter, and calls for further examination. So far as can be judged, Major Vibart's proposed deviation from a point near the village of Govindapulli to Mullapulli, combined with training the river by means of embankments and strongly constructed cross bunds east and west, appears to hold out the best solution.

22. Paragraph 27.—No remark called for further than that at either extremity of these 14 miles of canal flood-gates might with advantage be placed. It does not appear essential to make so long a deviation, (1 mile in length,) as proposed here by Major Vibart. If the present end of the channel as it enters the Kundalairoo river is turned east and north for about 2 furlongs, and made to enter the backwater close to the west of the Gungapalliem village, it will answer all purposes, as the backwater is believed to remain permanently deep at this point.

23. Paragraph 30.—The Kistnapatam basin must be extended as proposed. A flood-gate will be required south of the basin, and as regards the canal to the north, the banks must be raised and the channel isolated.

24. Paragraph 31.—At Nellatoor it will be necessary to cut a fresh channel for nearly two miles (95 M. 4 F. to 97 M. 6 F.,) a little east of the present line in rather higher ground, thus leaving the present channel free for the passage of drainage.

25. *Paragraph 32.*—The whole of the drainage here must be collected and passed across the channel at one point.

26. *Paragraph 33.*—Here again, of the three openings the central one must be kept clear for the passage of the drainage, closing the others.

27. *Paragraph 34.*—The Pennér river (114 M. 3 F. to 116 M. 6 F.) crossing is probably the most difficult matter to deal with in the length of the canal. Some Rs. 11,000 were spent in taking the silt out of the cut here (115 M. 4 F. and 116 M. 3 F.) within the first year of opening the canal, and in both the cyclones of 1879 not only has the same cut again silted up to within 9 inches of L.W.L., but the several branches of the river, five in number, show such a tendency to change their course that it has become a serious matter for consideration as to how the canal can here be kept open for traffic. Even were steam-dredges available, the canal would still be closed after each ordinary fresh in the river to all but top-boats and others of very light draft taking advantage of high tide, and the stoppage would be absolute after a cyclone flood of any intensity. No mere palliatives will therefore answer here, and my conviction is that the best and, in the end, by far the most economical course will be to train the Pennér in such a way from the head of its delta that the discharge shall take place entirely through its southernmost channel, closing all the others. This can be done by training the river from a point near the village of Utakoor, about three miles west of the canal, on the left bank. At the same time, groynes should be so constructed on the right bank, a little north of Kuddipalem, that the present line of river bank and the flood embankment within it shall be preserved from invasion. The left embankment would probably extend from Utakoor to the destroyed village of Palipalem. By this means not only would a sufficiently deep channel be always preserved in the southern branch of the river, but by closing the canal ends north and south with flood-gates, these would be preserved from the silting which now causes the difficulty. I do not consider that there should be any serious difficulty in training the Pennér as proposed, but further careful study of all the features is necessary.

28. *Paragraphs 37 and 38.*—Banking across the Ramatheertham drainage is inadmissible; it will be essential to cut a new line, of about six furlongs in length, to the west of the present line, so as to avoid getting dangerously close to the bar.

29. *Paragraphs 39 and 40.*—As with the Ramatheertham so with the Pydaru (123 M. 6 F.) and the Eskapally (126 M.) drainages, free vent must be allowed across the line of canal, but a strong west bank to keep out floods should be constructed. Whether it will be necessary eventually to isolate each of these portions with flood-gates (that at 117 M. is essential) cannot however be decided with certainty.

30. *Paragraph 42.*—The plan suggested of training the river so as to occupy and deepen out its central channel, and further to make a new cut to the west, of about two miles long, through ground 3 or 4 feet above M.S.L., seem essential. Since the cyclone of May 1879 the existing channel through the backwater has changed no less than four times.

31. Flood-gates will be required, one north of the Chippelairoo, at probably 134 M. and another at the 148 M. 2 F.

32. *Paragraph 46.*—The Ramapatam drainage, which enters at 148 M. 3 F. might have its outlet to the sea barred permanently, and the drainage thus taken into the canal utilised with a view to bringing a beneficial scour to bear on the northern portion towards the Elikeru.

33. *Paragraph 47.*—As regards this drainage it will be best to embank across the northern outlet, placing a flood-gate at 151 M. leaving the present southern opening (150 M. 6 F. to 150 M. 7 F.) free to discharge by the open bar.

34. To prevent the silting of the channel south of the Manneru, a flood-gate will be necessary at about 160 M.

35. The spill of the Manneru floods over the left bank of the river must be stopped by an embankment, but the most essential work here, and one which there should be no delay in carrying out, is the deviation of the present channel for about three furlongs in length, as suggested by Major Vibart. Without any cyclone flood in 1878 some three miles of channel here silted up to a depth of over 2 feet with ordinary

freshets, and there can be no question that flood-gates are essential at both the Manneru and Palar ends of this reach of the canal.

36. *Paragraphs 49 and 50.*—Agreed. It is essential that the spill of the Paleru floods over its right bank should be barred by a strong embankment from the north end of the present Pakala bank as far as the canal.

37. *Paragraph 51.*—The short portion of canal, six furlongs in length, between the Moosee and Palar rivers, having silted up in both the May and November cyclones of 1879, barring navigation, some early and effective means must be found for curing the present defects.

38. *Hand-dredging alone has not sufficed to allow of a passage being opened for any but boats of very light draft at high tide within two months after the last flood, and even then cargo boats drawing over 1' 9" have had to unload and have the goods carried by hand three-quarters of a mile.* For a short time after the November cyclone there was a passage to the east, close to the united bars of the two rivers, but this did not last long. Had powerful steam-dredges been available, and at once set to work, a passage might no doubt have been opened at an earlier date, but at the best it may be assumed that, subsequent to each of the cyclones of last year, this portion of the canal must have been closed to traffic for five or six weeks; it is thus clear that exceptional measures are called for to prevent as far as possible the recurrence of such delays, which if allowed to continue must affect very injuriously the traffic on the canal. Were it feasible to divert one or other river, so as to discharge both streams by a single channel into the sea, the difficulty now experienced would vanish, but as this means cannot I consider be adopted, it appears that the most effective and economical plan will be to excavate a second channel parallel to, and a little west of, the present cut, six furlongs long. This channel, measuring 15 feet in breadth at bottom and carried to 2½ feet below M.S.L., should be excavated as soon as possible. When opened to traffic the existing channel should be closed, cleared and deepened, opened for traffic, and the new subsidiary canal closed by temporary banks and prepared to receive the traffic after the next flood. By thus working alternately on two channels alongside of each other a feasible palliative for the existing difficulties will at least be provided. No west bank will be needed for the new channel, all spoil going to form a high strong bank for the existing cut so as to insure its isolation. Flood-gates at each extremity of the latter will also be needed, if not indeed for both channels.

39. *Paragraph 57.*—The preservation and management of the stretch of canal from one mile north of the Moosee bar (about 170 M.) to the Gundlakamma river depends on the treatment of the spill of the former river during flood over its left bank. Whether it be feasible to train the river by means of a left embankment, starting from a point near the village of Tirupu Nayadipalam, and thus force the whole floods through the present bar, is not clear, but the subject should receive attention.

40. For the present, immediate relief will be given by cutting away entirely the banks which were injudiciously thrown across the Tondairoo creek at 177 M. 2 F. and again at 177 M. 6 F. The effect of any further flood will be to bring a beneficial scour to bear on the whole length of the channel northward, towards the Gundlakamma.

41. Should, however, the training bank for the left bank of the Moosee river as suggested prove feasible, it would in that case probably be desirable to cut a fresh channel for the canal in the four furlongs a little to the east, so as to keep clear of the Tondairoo creek as proposed by Major Vibart. There should be a flood-gate at the end of the canal as it enters the Moosee river.

42. *Paragraphs 57 and 58.*—The basin at Kottapatam may, as suggested, consist of nothing more than an enlargement of the channel to the east and north of the present bridge. This latter, though shaken by the November cyclone, is now sufficiently secure to last with repairs for some years, and though boats in passing it have to lower their masts, there is no serious inconvenience, as they invariably halt at the place.

43. The road dam immediately west of the bridge must be removed (as being much too close to the canal) to a point on the Ongole road 300 yards further west; and be

there reconstructed 100 yards in length, lowest point of invert being 1 foot above H.W.L. The materials of the present dam will nearly suffice for the new, and the same style of tail apron should be employed. The western embankment of the canal (south of the bridge) should be much strengthened, and the road well raised over the site of the present dam, so as effectually to prevent any future invasion by flood water. The laterite bridge, which with its nine elliptical arches of 18 feet span carries off all the residue of the Tondairoo drainage not vented by the canal, should be thoroughly repaired as its flooring is still sound. The unworkman-like additions made on either side of the arches to bear the parapets, and which were much injured by the November flood, must be removed and the roadway reduced to about $9\frac{1}{2}$ feet in width. The removal and reconstruction of the road dam above adverted to must be charged to the canal, but the alterations of the bridge ought to devolve on the Local Fund Board, who may also fairly undertake the construction of the proposed Moosafirkhana at Utapotu.

44. *Paragraphs 59, 60, 61.*—Northward from Kottapatnam (179 to 187 M.) the banks originally low have suffered severely during the November cyclone, first by the action of the storm wave from the east, there being no protecting "dunes" here, and second, from the land flood which supervened. But notwithstanding this destruction of the banks the channel has been, if any thing, improved owing to the fact that the surplus of the Moosee river flood vented itself through the Tondairoo creek, and finding its way into the canal scoured it throughout and cleared it of silt. Practically, therefore, little work is required in this reach. In a few places a strong, well planted, east bank will be needed to counteract the action of a storm wave; but on the west the less obstruction presented to the land flood the better, unless at some future time the expense of a sufficiently high and strong isolating west bank be considered essential. As matters stand, levelling down the bank as much as possible and bringing the tow-path into order is all that need be thought of. No vegetation seems to thrive here owing to the salt dust carried by the west winds which smothers and kills even the "woolsa" rush and the salt plant "eela," both of which thrive elsewhere. So long as the channel is not isolated no flood-gate is necessary at the Gundlakamma.

45. *Paragraph 62.*—The crossing of the Gundlakamma river calls for no special remark.

46. *Paragraph 63.*—As regards the proposals in this paragraph I have seen reason for the present at least to prefer flood-gates nearly everywhere to locks, the grounds for which will be found elsewhere.

47. *Paragraph 64.*—For five miles north of the Gundlakamma river the canal is exposed to serious wash, particularly at two places where bars opened in the November cyclone, and which must therefore be left free of any obstruction. To all appearances, however, the spill water from the Gundlakamma might, as suggested by Sub-Engineer Ottmann, be effectually checked by constructing a strong training bank along the left bank of the river, two or three miles in length, and diverting the drainage from the Kanuparti swamp. The alternative to this plan would be to construct a strong west bank all along the canal. In addition to protection on the west, a well-planted east bank is also needed at two places, but only for short lengths. Major Vibart has suggested an entirely new channel between $199\frac{1}{2}$ and $191\frac{1}{2}$ M. *190 and 192 1/2* but as the object here must be to get sufficiently inland from the Kanuparti bar, to which the present line is dangerously near, it will suffice to make the new cut to the westward of only three furlongs in length at a distance of 200 yards from the existing channel.

48. *Paragraphs 66, 67, 68.*—Little remark called for. It may be doubted whether the position of the new lock at Feringy Dibba has been judiciously selected, and whether, looking to the great drainage which sweeps over the whole country south of Santaravoor, it would not have been safer to have given another flight to this latter lock, and dropped the canal thus direct into the Rompairoo drainage. It is now however too late to suggest any alteration of the arrangements here.

49. *Paragraph 69.*—The reasoning here employed by Major Vibart in favor of isolating the different reaches of the canal which intervene between drainages that cannot safely, particularly during flood, be barred in the passage to the sea, derives additional force from the effects of the November cyclone which followed on the

one which occurred in May and which is the subject of his report. But there is such a strong and, it must be admitted, well-founded objection to the delays inseparable from locks, added to the great expense of first construction and subsequent working, a regular establishment being necessary for each all the year round, that I have proposed for the present at least to construct flood-gates at the end of each reach. These would only be closed on extreme occasions to exclude silt and flood from the channel. They would be comparatively cheap in construction, could be made portions of locks at any future time should such be considered requisite, would in no way interfere with or delay traffic, and need only have a small establishment to look after them in the cyclone or flood period. Inlet weirs I also see no immediate necessity for, but the depth of the canal and even its section may now with advantage be much diminished to meet actual requirements. These and other subjects will however be discussed in a separate paper.

50. *Paragraph 70.*—The training of the several large drainages, and the necessity for a special study of each case, has been sufficiently pointed out in the above remarks, but here, as elsewhere, Major Vibart seems to favor the use of inlets and outlets of masonry for the disposal of minor drainages. I very much question the applicability of works of this character to the canal, as in hardly any case is there means of securing a proper outfall for the water on the down or eastern side of the channel. There may however be a few cases in which the principle might be accepted, and where this is the case the plan might be tried, adding however a capacious silt trap on the upper or west side of the canal. This should be kept always clear. It seems to me that all drainages which cannot be effectually shut out and diverted into other lines must of necessity be allowed free vent at a level across the canal, and that everything in the shape of an obstruction would be a mistake.

CHEPAUK,
10th April 1880.

R. H. SANKEY, Colonel, R.E.,
Chief Engineer.

Appendix to G.O., No. 284 W., of 6th February 1880.

OBSERVATIONS BY THE CHIEF ENGINEER ON MAJOR VIBART'S BUCKINGHAM CANAL INSPECTION NOTES DATED 27TH SEPTEMBER 1879.

Paragraph 1.—The requisite survey establishment has been sanctioned, and the Superintendent of Works, Captain Awdry, is engaged in preparing the estimate for submission to the Government of India. Tide gauges have been established in all backwaters and open estuaries, as also at intermediate points along the canal.

2. Paragraph 3.—For sanitary purposes it is most desirable that the level of the water in the Cooum and Adyar rivers should, as far as possible, be maintained at 3.5 feet above mean sea level, and to do this the lock here proposed would be indispensable, as with the Covelong bar open (maximum rise of tide 2.92 feet above and low water 0.70 below M.S.L.) the water would otherwise escape through the southern canal. The necessity for constructing a dam here is not sufficiently apparent to warrant the work being included in the estimate as yet.

3. Paragraph 4.—Under the present arrangements for taking the tolls, the proposed landing place would not help traffic, but Captain Awdry has a proposal for altering the sections so soon as the channel shall be open as far as the Cheyoor backwater, which if combined with a proper opening, headway being given to the South Indian Railway bridge, would permit and encourage traffic through the Junction Canal.

4. Paragraph 5.—Appended is a detailed statement of the spans and headways of the bridges, the former being generally under 20 feet each, and the latter as low as 9.22 feet at M.S.L. The headway is thus only 5.72 feet when the level of the water is 3.5 feet above M.S.L., and is therefore much too low. The expense of altering all these bridges, fourteen in number, would be prohibitory for the present, but means should be found by corbeling or otherwise to provide an 18-inch wide board for the towing coolies to pass. To prevent water escaping from the Cooum when the Adyar bar is open, a lock should be built at south end of the Junction Canal. So long as it can be managed without injury to the channel or the bridges a scour may be provided for in order to remove silt.

STATEMENT showing the clear headway and span of Bridges over the Buckingham Canal.

Mileage from Basin.	Name of Bridges.	Minimum span at M.S.L. in feet.	Maximum height above M.S.L. in feet.	Remarks.	Height available above M.S.L. for boats	
					With tops 10 feet wide.	With tops 13 feet wide.
M. F.	Bridges north of Cochrane's Basin.					
0 4	Ráyapuram Railway bridge	59	10.72	Iron girder bridge	10.72	10.72
1 4½	Washermanpettah bridge	43	10.00	Masonry segmental arch	9.60	9.40
3 6	Theroovattoor bridge	43	10.00	Do. do.	9.58	9.36

Statement showing the clear headway and span of Bridges over the Buckingham Canal—cont.

Mileage from Basin.	Name of Bridges.	Minimum span at M.S.L. in feet.	Maximum height above M.S.L. in feet.	Remarks.	Height available above M.S.L. for boats	
					With tops 10 feet wide.	With tops 13 feet wide.
Bridges south of Basin.						
0 0	Basin bridge	50-00	12-52	Masonry segmental arch	12-17	11-94
0 4	Salt Cotaar bridge	29-66	8-64	Wooden bridge	8-64	8-64
0 6½	Elephant Gate bridge	49-00	10-94	Masonry segmental arch	10-52	10-28
0 7	Central Station Railway bridge	64-00	9-35	Iron girder bridge	9-35	9-35
1 4½	General Hospital bridge	49-00	11-04	Masonry segmental arch	10-62	10-38
..	South Indian Railway bridge	13-91	7-03	Wooden bridge	7-03	7-03
1 6	Saint Mary's bridge	29-00	11-49	Do. metalled	11-49	11-49
2 3	Government House bridge	32-00	10-40	Masonry segmental arch	9-74	9-53
3 0	Marine Villa	19-83	10-92	Iron piles rough stone abutments.	10-92	10-92
3 2	Chepauk bridge	19-62	10-92	Masonry segmental arch	9-92	9-17
3 6	Pycroft's road bridge	19-62	11-29	Do. do.	10-29	9-54
3 7½	Soonkarammah Street bridge	20-17	11-52	Masonry and wooden platform.	11-52	11-52
4 2	Ice House road	19-83	11-68	Masonry segmental arch	10-68	9-93
4 6½	Elliott's road	20-17	11-77	Masonry semicircular arch	10-44	9-35
5 0	Barber's bridge	27-33	9-71	Masonry and wooden platform.	9-71	9-71
5 3½	Moondacunny Covil road bridge	20-00	13-22	Do. do.	13-22	13-22
5 5	Cuteherry road	19-58	10-42	Masonry semicircular arch	9-09	8-00
5 5½	Brodie's road bridge	20-17	10-89	Do. do.	9-68	8-77
..	Poonthotum aqueduct	20-42	10-05	Masonry wooden platform	10-05	10-05
6 3	Yellapatha Mauda Covil road	20-25	9-22	Do. do.	9-22	9-22
..	Soolay Cauthoy Syphon	21-83	10-00	Do. do.	10-00	10-00
7 1½	Greenaway's bridge	21-00	13-03	Masonry segmental arch, skew	12-03	11-03
8 0	Guindy bridge, span excluding tow paths.	45-00	15-42	Masonry elliptical arch	15-17	15-09
10 0	Lattice bridge do. do. ..	43-00	12-14	Masonry abutments and wooden structure.	12-14	12-14
42 0	Sadras bridge do. do. ..	43-75	13-83	Masonry elliptical arch	13-58	13-50
45 0	Ismalpett bridge do. do. ..	35-00	14-75	Masonry semicircular arch	14-38	14-13

* The figures in antique show the Bridges having the least headway.

5. Paragraph 7.—Observations concurred in.

6. Paragraph 8.—A flood-gate which would form no impediment to traffic would answer all purposes.

7. The sewage of all the north portion of Black Town should unquestionably be diverted from discharging into the canal by an intercepting sewer, to be constructed by the Municipality.

8. Paragraph 9.—Agreed.

9. Paragraph 10.—Approved, but the question will require further study. Some of the present lime kilns which occupy the needed ground must be removed.

10. Paragraph 12.—New bridges should be provided for, but the removal of the present structures is not a matter of urgency.

11. Paragraphs 13 and 14.—This lock has not sufficient height to clear it in maximum floods, and is at least half a mile too far north. It will be necessary to remove this lock and take a new isolated channel from 6 M. 6 F. through the ground to the east as far as 9 M. 3 F. where there should be a flood-gate. By these arrangements the canal will be preserved from the effects of the floods of the Kortalayár and of the Red Hill tank drainage, from both of which it now suffers greatly at times.

12. Paragraph 15.—From 11½ to 20½ M. should be taken in a new isolated channel east of the backwater, with flood-gates at either end. The existing deep portion of canal between 17 M. and 19 M. might be included in this new line. Owing to the oozy nature of the bottom in the existing backwater, dredging would have no permanent effect.

13. The opening into the Chintamony backwater will have in any case to be left open for the free passage of flood water. From immediately beyond this point, and to the entrance of the lake beyond the town of Pulicat, careful study is required. So far as can

be judged, however, a feasible plan would seem to consist in making an isolated channel 4½ miles in length along the west margin of the backwater, between 20½ M. and 25 M., with flood-gates at either end.

14. I do not approve of the proposal to bank across the opening at 20½ M., nor to take the canal along the east margin close up to the bar; this would certainly be dangerous for boats during flood.

15. Paragraph 17.—The only apparent means for ensuring a sufficiently protected line along all this portion will be to take a new isolated line, as proposed, along the depression which commences a little north of the Pulicat bar. Some palliatives are feasible, e.g., altering slightly the end of the south cut in the lake so as to carry it into deep water, but there is no radical cure apparently for the admitted difficulties of the present line, which is throughout exposed to the wide expanse of water on the west.

16. The only part of the line which can be considered as adequately protected between Pulicat and Cusbah is the short portion between 35 M. 7 F. and 38 M., and this of course can be taken into the new line.

17. From a peculiarity in the conformation of the Pulicat lake, it appears that, when the waters of excessive floods begin to subside, the canal from a little north of 36 M. acts as a surplus channel. A very beneficial scour is thus found to have been set up throughout the line to its southern debouchure in the lake at 27 M. This peculiarity should be turned to use for the new isolated line by the construction of a powerful head sluice in the west bank at 36 M., and a scour produced in the channel down to the bar whenever circumstances favor. A sluice with five or six openings, 6 feet wide each, would apparently suffice.

18. Whether a flood-gate would be needed at the southern extremity near the Pulicat bar is not as yet clear.

19. Paragraph 22.—From Cusbah, 45 M., northwards a strong west bank, well above flood level, is essential, and the canal should be isolated up to 68 M., where a flood-gate may be placed. An interval will here have to be left for the passage of flood water, and the new cut to the west of the backwater, as suggested by Major Vibart, made up to Dugarápatnam, 69 M. This short portion will also need to be isolated by flood-gates at either end. The proposed basin at Dugarápatnam should, as elsewhere, consist of a simple widening of the channel.

20. Paragraph 24.—If on further inquiry the drainage which enters at 71 M. 5 F. cannot safely be barred from entering the canal, a flood-gate must be placed a little north. I do not consider a sluice weir, as proposed here, to be suitable. Another flood-gate will be needed a little south of the Swarnamukhi river. This reach of canal, 4 miles in length, will thus, with the embankments proposed, be thoroughly isolated in case of flood.

21. Paragraph 25.—The crossing of the Swarnamukhi river is a complicated matter, and calls for further examination. So far as can be judged, Major Vibart's proposed deviation from a point near the village of Govindapulli to Mullapulli, combined with training the river by means of embankments and strongly constructed cross-bunds east and west, appears to hold out the best solution.

22. Paragraph 27.—No remark called for further than that at either extremity of these 14 miles of canal flood-gates might with advantage be placed. It does not appear essential to make so long a deviation, (1 mile in length,) as proposed here by Major Vibart. If the present end of the channel as it enters the Kundalairoo river is turned east and north for about 2 furlongs, and made to enter the backwater close to the west of the Gungapalliem village, it will answer all purposes, as the backwater is believed to remain permanently deep at this point.

23. Paragraph 30.—The Kistnapatam basin must be extended as proposed. A flood-gate will be required south of the basin, and as regards the canal to the north, the banks must be raised and the channel isolated.

24. Paragraph 31.—At Nellatoor it will be necessary to cut a fresh channel for nearly two miles (95 M. 4 F. to 97 M. 6 F.,) a little east of the present line in rather higher ground, thus leaving the present channel free for the passage of drainage.

25. *Paragraph 32.*—The whole of the drainage here must be collected and passed across the channel at one point.

26. *Paragraph 33.*—Here again, of the three openings the central one must be kept clear for the passage of the drainage, closing the others.

27. *Paragraph 34.*—The Pennér river (114 M. 3 F. to 116 M. 6 F.) crossing is probably the most difficult matter to deal with in the length of the canal. Some Rs. 11,000 were spent in taking the silt out of the cut here (115 M. 4 F. and 116 M. 3 F.) within the first year of opening the canal, and in both the cyclones of 1879 not only has the same cut again silted up to within 9 inches of L.W.L., but the several branches of the river, five in number, show such a tendency to change their course that it has become a serious matter for consideration as to how the canal can here be kept open for traffic. Even were steam-dredges available, the canal would still be closed after each ordinary fresh in the river to all but top-boats and others of very light draft taking advantage of high tide, and the stoppage would be absolute after a cyclone flood of any intensity. No mere palliatives will therefore answer here, and my conviction is that the best and, in the end, by far the most economical course will be to train the Pennér in such a way from the head of its delta that the discharge shall take place entirely through its southernmost channel, closing all the others. This can be done by training the river from a point near the village of Utakoor, about three miles west of the canal, on the left bank. At the same time, groynes should be so constructed on the right bank, a little north of Kuddipalem, that the present line of river bank and the flood embankment within it shall be preserved from invasion. The left embankment would probably extend from Utakoor to the destroyed village of Palipalem. By this means not only would a sufficiently deep channel be always preserved in the southern branch of the river, but by closing the canal ends north and south with flood-gates, these would be preserved from the silting which now causes the difficulty. I do not consider that there should be any serious difficulty in training the Pennér as proposed, but further careful study of all the features is necessary.

28. *Paragraphs 37 and 38.*—Banking across the Ramatheertham drainage is inadmissible; it will be essential to cut a new line, of about six furlongs in length, to the west of the present line, so as to avoid getting dangerously close to the bar.

29. *Paragraphs 39 and 40.*—As with the Ramatheertham so with the Pydaru (123 M. 6 F.) and the Eskapally (126 M.) drainages, free vent must be allowed across the line of canal, but a strong west bank to keep out floods should be constructed. Whether it will be necessary eventually to isolate each of these portions with flood-gates (that at 117 M. is essential) cannot however be decided with certainty.

30. *Paragraph 42.*—The plan suggested of training the river so as to occupy and deepen out its central channel, and further to make a new cut to the west, of about two miles long, through ground 3 or 4 feet above M.S.L., seem essential. Since the cyclone of May 1879 the existing channel through the backwater has changed no less than four times.

31. Flood-gates will be required, one north of the Chippelairoo, at probably 134 M. and another at the 148 M. 2 F.

32. *Paragraph 46.*—The Ramapatam drainage, which enters at 148 M. 3 F. might have its outlet to the sea barred permanently, and the drainage thus taken into the canal utilised with a view to bringing a beneficial scour to bear on the northern portion towards the Elikeru.

33. *Paragraph 47.*—As regards this drainage it will be best to embank across the northern outlet, placing a flood-gate at 151 M. leaving the present southern opening (150 M. 6 F. to 150 M. 7 F.) free to discharge by the open bar.

34. To prevent the silting of the channel south of the Manneru, a flood-gate will be necessary at about 160 M.

35. The spill of the Manneru floods over the left bank of the river must be stopped by an embankment, but the most essential work here, and one which there should be no delay in carrying out, is the deviation of the present channel for about three furlongs in length, as suggested by Major Vibart. Without any cyclone flood in 1878 some three miles of channel here silted up to a depth of over 2 feet with ordinary

freshets, and there can be no question that flood-gates are essential at both the Manneru and Palar ends of this reach of the canal.

36. *Paragraphs 49 and 50.*—Agreed. It is essential that the spill of the Paleru floods over its right bank should be barred by a strong embankment from the north end of the present Pakala bank as far as the canal.

37. *Paragraph 51.*—The short portion of canal, six furlongs in length, between the Moosee and Palar rivers, having silted up in both the May and November cyclones of 1879, barring navigation, some early and effective means must be found for curing the present defects.

38. Hand-dredging alone has not sufficed to allow of a passage being opened for any but boats of very light draft at high tide within two months after the last flood, and even then cargo boats drawing over 1' 9" have had to unload and have the goods carried by hand three-quarters of a mile. For a short time after the November cyclone there was a passage to the east, close to the united bars of the two rivers, but this did not last long. Had powerful steam-dredges been available, and at once set to work, a passage might no doubt have been opened at an earlier date, but at the best it may be assumed that, subsequent to each of the cyclones of last year, this portion of the canal must have been closed to traffic for five or six weeks; it is thus clear that exceptional measures are called for to prevent as far as possible the recurrence of such delays, which if allowed to continue must affect very injuriously the traffic on the canal. Were it feasible to divert one or other river, so as to discharge both streams by a single channel into the sea, the difficulty now experienced would vanish, but as this means cannot I consider be adopted, it appears that the most effective and economical plan will be to excavate a second channel parallel to, and a little west of, the present cut, six furlongs long. This channel, measuring 15 feet in breadth at bottom and carried to 2½ feet below M.S.L., should be excavated as soon as possible. When opened to traffic the existing canal closed by temporary banks and opened for traffic, and the new subsidiary canal closed by temporary banks and prepared to receive the traffic after the next flood. By thus working alternately on two channels alongside of each other a feasible palliative for the existing difficulties will at least be provided. No west bank will be needed for the new channel, all spoil going to form a high strong bank for the existing cut so as to insure its isolation. Flood-gates at each extremity of the latter will also be needed, if not indeed for both channels.

39. *Paragraph 57.*—The preservation and management of the stretch of canal from one mile north of the Moosee bar (about 170 M.) to the Gundlakamma river depends on the treatment of the spill of the former river during flood over its left bank. Whether it be feasible to train the river by means of a left embankment, starting from a point near the village of Tirupu Nayadipalum, and thus force the whole floods through the present bar, is not clear, but the subject should receive attention.

40. For the present, immediate relief will be given by cutting away entirely the banks which were injudiciously thrown across the Tondairoo creek at 177 M. 2 F. and again at 177 M. 6 F. The effect of any further flood will be to bring a beneficial scour to bear on the whole length of the channel northward, towards the Gundlakamma.

41. Should, however, the training bank for the left bank of the Moosee river as suggested prove feasible, it would in that case probably be desirable to cut a fresh channel for the canal in the four furlongs a little to the east, so as to keep clear of the Tondairoo creek as proposed by Major Vibart. There should be a flood-gate at the end of the canal as it enters the Moosee river.

42. *Paragraphs 57 and 58.*—The basin at Kottapatam may, as suggested, consist of nothing more than an enlargement of the channel to the east and north of the present bridge. This latter, though shaken by the November cyclone, is now sufficiently secure to last with repairs for some years, and though boats in passing it have to lower their masts, there is no serious inconvenience, as they invariably halt at the place.

43. The road dam immediately west of the bridge must be removed (as being much too close to the canal) to a point on the Ongole road 300 yards further west; and be