

(1) Number of pages _____

(2) Date of repair _____

(3) Initials of the Referencer _____

MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No.	<i>8/11</i>	Press	<i>Regent</i>
B.P. No.		Mis.	
Dated	<i>23 - 3 -</i>	<i>1875</i>	
		195	

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
23rd March 1875*

No. 559. Read the following letter from R SMITH, Esq., District Engineer, Nellore, to Colonel G. W. WALKER, R E, Secretary to Government, Public Works Department, dated Nellore, 8th February 1875, No. 108:—

I HAVE the honor to forward, I enclose,* the survey and sections of the reach of the East Coast Canal between the Kundalairu and the Pennair, a distance of miles 21.217, and to submit an estimate, amounting to Rupees 2,74,000,

4 Estimates.
1 Specification.
* 27 Drawings

for the construction of that line of navigation. The rates proposed have been fixed with reference to those allowed for, and prevailing on, the portion of the canal now under execution, and I have to add that I believe them to be ample, but by no means excessive, as working on this line is occasionally very difficult and discouraging.

2. The alignment of the canal, proposed in these papers, differs but little from that contemplated by Lieutenant (now Colonel) Chambers, R E, 19 years ago. Two modifications only are really deserving of notice, and these I will now briefly refer to. The first is near the mouth of the Kundalairu; the second is within the limits of the village of Koratoor. Colonel Chambers intended making the Kundalairu the line of navigation between the points marked A and B on the accompanying sketch map, but I am not disposed to recommend that arrangement, as I consider it would be difficult to preserve a good navigable passage in the vicinity of C, as that outlet is apparently silting up. Another objection to utilizing that reach of the Kundalairu is its proximity to the bar, and the consequent risk that boats would be exposed to during high floods in that river. I therefore propose taking off the canal from the left bank of the Kundalairu at the point marked D. This alignment will be rather more expensive in the first instance than Colonel Chambers', and it will entail the maintenance of a ferry in the line of the Kistnapatam road; but I am convinced the modification is very necessary if any approach to a first-class line of navigation is contemplated. At Koratoor I consider the canal should be taken more inland, than originally intended, to avoid the drift sand. In selecting the line, on the east of the bungalow on the Koratoor beach, Colonel Chambers had apparently two objects in view—the preservation of direct communication between the village and the bungalow and the conservation of the adjacent wet lands. The former I propose to provide for by a ferry boat on the canal, and with reference to the latter it was no doubt desirable, some years ago, to forego many advantages rather than interfere with wet cultivation; but at the present time, with a supply of water available for the whole Pennair Delta, I think a few acres of rice land may be taken up for an important communication without much compunction or inconvenience.

3. In connection with the arrangements for navigation, in the vicinity of Kistnapatam, the reach of the Kundalairu, from D to E, will be most useful for the Nellore heavy traffic, as it is navigable at all seasons.

4. It will be observed that the proposed line joins the main or southern mouth of the Pennair not far from the bar; this is objectionable, but it is the only suitable junction. In fact, I think it would be impossible to find another that could be kept open for navigation without a heavy expenditure annually.

5. In deciding on the alignment of the canal it was necessary, in parts, to avoid the cheapest line, and to select one less likely to be silted up by the local

rates for earthwork in the latter estimate ranged from $1\frac{1}{2}$ to 6 Annas per cubic yard, while those of the present estimate range from $1\frac{1}{2}$ to $5\frac{1}{2}$ Annas; an extra allowance of 3 Pies per cubic yard for sectioning the banks being made in both estimates.

The charges for providing intercepting drainage channels, for compensation, and for superintendence and sundries, are higher than before; so that it would appear on the whole that the working rates do not exceed those estimated, and that actual experience gives reason to believe that a mileage rate of Rs. 12,500 will not be exceeded, which for the entire length of 126 miles, between Doogarazapattam and the Kistna District, gives a total of $15\frac{1}{2}$ lakhs.

2 The deviations from the line of canal originally proposed appear to be justified by the reasons given by Mr. R. Smith. He proposes to dispense with bridges over the canal and to provide ferry boats only at Kistnapattam, Kottapalem, Nalatoor, Iduru, Kantopilly, Koduru, Venkanapalem, Koratoor, Mypaud and Pallipalem, also to dispense with irrigation syphons for maintaining such cultivation as exists between the canal and the sea, on the ground of their expense being disproportionate to the amount of cultivation concerned. It may be found necessary hereafter to modify those views in part as the work proceeds; and the Collector will be instructed, in the Revenue Department, to investigate each case in time, and to report if he considers that its requirements have not been fully met.

3. As remarked in paragraph 3, there is reason to suppose that the entire cost of extending the East Coast Canal to the Kistna District will be about $15\frac{1}{2}$ lakhs. Of which, assuming $2\frac{1}{4}$ lakhs as spent up to the end of 1874-75 and $\frac{3}{4}$ lakhs as the rate of annual outlay (both sums being overstated), it will take upwards of 17 years to complete so much of the project; after which there may still remain few miles to connect Madras with the navigable canals of the Kistna and Godavery. No adequate return, either direct or indirect, can be expected till such connection shall have been made. It is therefore expedient, on financial considerations alone, to proceed with the work, at least at double the rate of progress above mentioned. And the District Engineer will report in what manner such rate of progress may be attained without interfering with the other important works of the district; whether by concentration of more labor on the sections already surveyed and estimated, or by taking in hand, as fast as they are laid out, other sections with labor drawn from fresh sources. The District Engineer of the Kistna is likewise called on to report the extent of work that has to be planned and estimated for in his district.

(True Extract)

Colonel, R.E.,

Secretary to Government.

To the District Engineer, Nellore.

" " Kistna.

" Controller of Public Works Accounts

" Revenue Department

" Financial "

Frd S T Austin

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drainage, or by the drift sand. The soil here, for a considerable distance, north and south of the village of Kistnapattam, are reported to be a loam, at the rate of two or three yards annually, and I thought it absolutely necessary to leave a considerable margin between them and the canal. North of Chennayhyppalem the soil is comparatively low, and mostly covered with vegetation, and as I believe they will not give trouble or add to the working expenses of the canal, it has been set out rather close to them, where the adjoining ground is favorable.

6. As there are only a few hamlets on the east of the canal, and as the line of the three existing roads will, practically, begin or end at the canal, as the case may be, I do not consider bridges of any kind necessary over this section of the line. A simple provision has, however, been made in the estimate for ferry boats capable of carrying cattle and handies across the canal at all seasons. The wheeled traffic is so very limited in those parts that, with one exception, it is scarcely deserving of notice; but, as before stated, arrangements have been made for maintaining speedy communication between the narrow strip of land on the east of the canal and the villages on the west of it. The exception alluded to is the Kistnapattam road, on which there is a moderate traffic, to the small port of Kistnapattam; but the trade to that port by sea going boats will be so very much reduced if it does not cease altogether, after the opening of the canal, that a ferry boat of the description proposed would more than suffice to meet the probable future requirements of the traffic intended for that particular route.

7. The bars between the Kandakur and the Pennar, in the immediate vicinity of the proposed canal, are so small, and so very seldom open, that they will not interfere with the navigation to any appreciable extent.

8. To prevent salting as much as possible, provision has been made in the estimate for keeping the bulk of the local drainage out of the cuts forming the canal between the several backwaters. The drainage will in all cases, except where the configuration of the country is favorable to admitting it into the artificial reaches of the canal, be carried parallel to them and discharged into the nearest or most convenient, backwater.

9. Compensation has been allowed in the estimate for the wet cultivation on the east of the canal, as the area is too small to justify the expenditure that would be necessary to construct the required irrigation syphons.

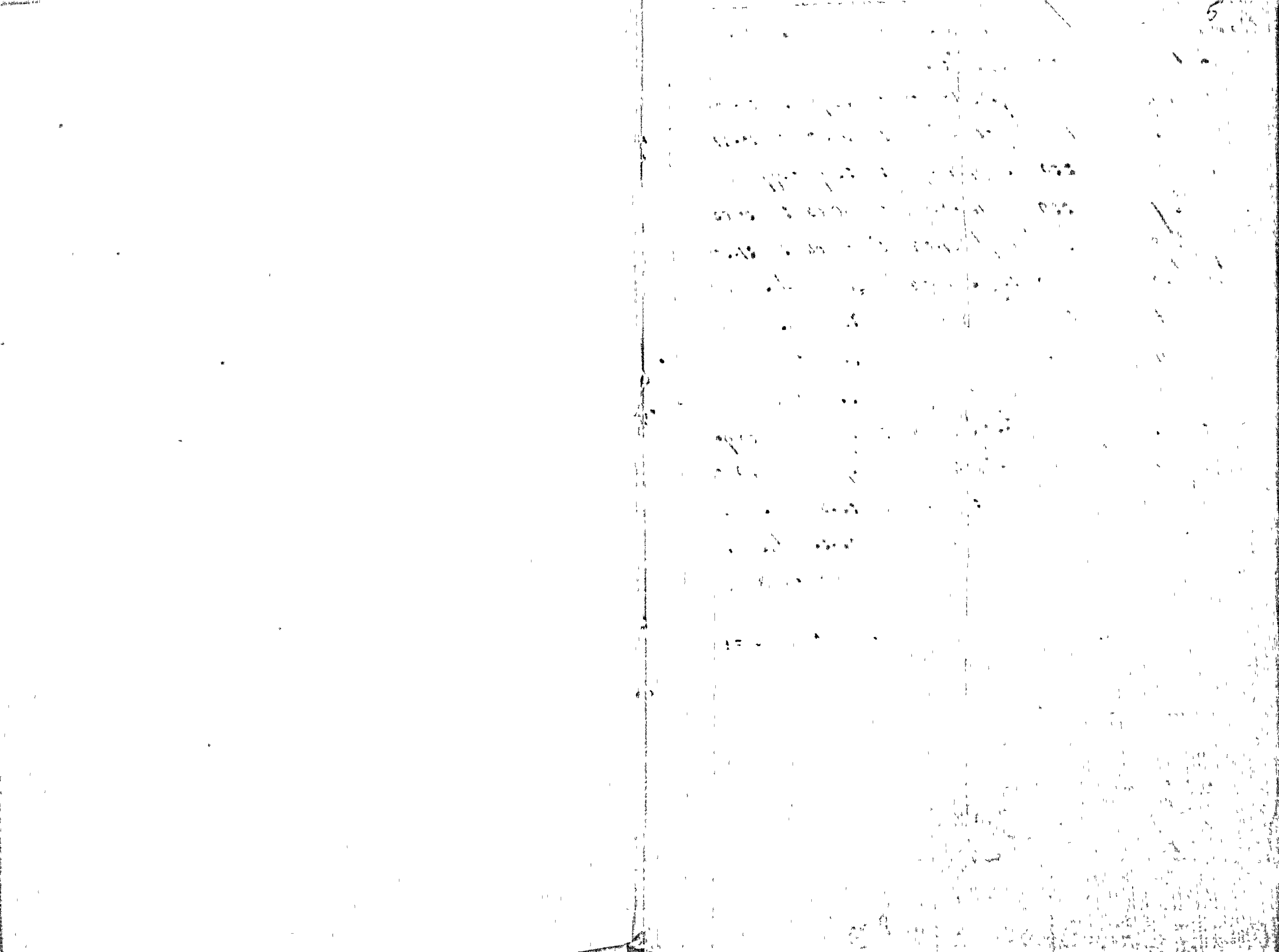
10. In conclusion, I have to state that I very much regret the delay that has occurred in submitting the accompanying papers; but no course was made to dispatch them sooner, but press of work, ordinary and extraordinary, materially interfered with their preparation.

No. 500.

Ordered thereon, 23rd March 1875, No. 814.

CIVIL WORKS, No. 23.

With the above letter the District Engineer of Nellore submits an estimate of Rs. 2,71,000 for extending the river below Nellore, a distance of $2\frac{1}{2}$ miles. The scheme of canal extension already in hand from Doogarazapattam to Kistnapattam, an estimate of Rs. 2,57,000, sanctioned in G. O., No. 271, of 29th January 1875, is $20\frac{1}{2}$ miles in length. The



21 to 22	330	5.67	46.68	3	35.34	2.67	.	.
22 to 23	330	5.67	46.68	3	35.34	2.67	.	.
23 to 24	330	5.665	46.66	3	35.33	2.665	.	.
24 to 25	330	5.455	45.82	3	34.91	2.455	.	.
25 to 26	330	5.345	45.38	3	34.69	2.345	.	.
26 to 27	330	5.83	47.32	3	35.66	2.83	.	.
27 to 28	330	5.905	47.62	3	35.81	2.905	.	.
28 to 29	330	5.29	45.16	3	34.58	2.29	.	.
29 to 30	330	5.125	44.50	3	34.25	2.125	.	.
30 to 31	330	5.32	45.28	3	34.64	2.32	.	.
31 to 32	330	4.91	43.64	3	33.82	1.91	.	.
32 to 33	330	4.45	41.82	3	32.90	1.45	.	.

46213.20	31138.07	77351.27
46213.20	31138.07	77351.27
46193.40	30070.96	76264.36
45361.80	28282.33	73644.13
44926.20	26844.85	71771.05
46846.80	33302.87	80149.67
47143.80	34329.25	81473.05
44708.40	26132.10	70840.50
44055.00	24017.81	68072.81
44827.20	26520.38	71347.58
43203.60	21316.75	64520.35
41382.00	15742.65	57124.65

Total Cubic feet of Earthwork 725610 60 45 23 16 30 " " 1177926.90
 of Cypar. 26874 47 16 75 2 45 " " 43626.92

3rd Mile

From 33 to 34	330	5.03	44.12	3	35.56	2.03	.	.
34 to 35	490	6.61	50.44	3	38.44	3	31.22	0.61
35 to 36	170	7.34	53.36	3	41.36	3	32.68	1.34
36 to 37	330	6.645	50.58	3	38.58	3	31.29	0.645
37 to 38	330	5.99	47.96	3	35.98	2.99	.	.
38 to 39	330	5.505	46.02	3	36.01	2.505	.	.
39 to 40	330	5.30	45.20	3	34.60	2.30	.	.

43678.80	22816.79	66495.59
74146.80	56506.80	139986.25
27213.60	21093.60	55751.70
50074.20	38194.20	94928.47
47480.40	36501.86	82981.86
45559.80	28941.00	74500.80
44748.00	26261.00	71009.00

40 to 41	330	5.44	45.76	3	34.88	2.44	
41 to 42	330	5.55	46.22	3	36.11	2.55	
42 to 43	330	5.68	46.72	3	35.36	2.68	
43 to 44	330	5.81	47.26	3	35.63	2.81	
44 to 45	330	5.81	47.24	3	35.62	2.81	
45 to 46	330	5.82	47.28	3	35.64	2.82	
46 to 47	330	5.74	46.96	3	35.48	2.74	
47 to 48	330	5.70	46.82	3	35.41	2.70	
48 to 49	330	5.77	47.10	3	35.50	2.77	
<u>4.5 Mile</u>							
From 49 to 50	330	6.93	51.72	3	39.72	3	31.36 0.93
50 to 51	330	7.01	52.06	3	40.06	3	32.25 1.01
51 to 52	330	5.95	47.80	3	35.90	2.95	
52 to 53	330	7.20	52.82	3	40.82	3	32.41 1.20
53 to 54	330	8.79	59.80	3	47.80	3	35.90 2.79
54 to 55	330	8.98	59.92	3	47.92	3	35.96 2.98
55 to 56	330	9.34	61.38	3	49.38	3	37.38 3
56 to 57	330	9.92	63.68	3	51.68	3	39.68 3
57 to 58	330	9.13	60.54	3	48.54	3	36.54 3
58 to 59	330	9.78	63.14	3	51.14	3	39.14 3
59 to 60	330	9.77	63.10	3	51.10	3	39.10 3

	45302.40	28085.37		73387.77
	45757.80	30446.14		76203.94
	46252.80	31272.38		77525.18
	46787.40	33098.49		79885.89
	46767.60	33030.42		79798.02
	46807.20	33166.58		79973.78
	46490.40	32081.16		78571.56
	46351.80	31608.73		77960.53
	46629.00	32509.12		79138.12
Stat of C. & G. R. R.	750048.00	514613.24	23436.22	1288097.46
at C. & G. R. R.	277779.56	19059.75	868.00	47707.31
" " " "	51202.80	39322.80	9624.38	100129.98
" " " "	51539.40	37659.40	10728.44	101927.24
Stat of C. & G. R. R.	102742.20	78982.20	20352.82	202077.22
at C. & G. R. R.	3805.26	29252.6	753.808	7484.34
	47322.00	34948.65		82270.65
	52291.80	40411.80	12888.83	105592.43
	59202.00	47322.00	33112.36	139636.36
	59320.80	47440.80	35363.06	142124.66
30.69 0.345	60766.20	48886.20	37006.20	150152.65
37.84 0.92	63043.20	51163.20	39283.20	163156.22
30.27 0.135	59934.60	48054.60	36174.60	145512.32
31.57 0.785	62508.60	50628.60	38748.60	160064.00
31.55 0.775	62469.00	50589.00	38709.00	157835.71

60 to 61	330	9.745	62.98	3	50.98	3	38.98	3
61 to 62	330	11.19	68.76	3	56.76	3	44.76	3
62 to 63	330	10.99	67.96	3	55.96	3	43.96	3
63 to 64	330	10.15	64.60	3	52.60	3	40.60	3
64 to 65	330	9.54	62.16	3	50.16	3	38.16	3

31.09 0.745	62350.20	50470.20	38590.20	7741.81	159152.41
34.38 2.19	68072.40	56192.40	44312.40	24846.42	193423.62
38.98 1.99	67280.40	55400.40	43520.40	22314.66	188515.86
32.30 1.15	63954.00	52074.00	40194.00	12257.85	168479.85
31.16 0.54	61538.40	49658.40	37778.40	5552.71	154527.91

Total Effects of Earthwork { 850053.60 683240.25 475681.25
 — or Cypars 31483.46 25205.19 17617.82 103469.75 3832.21
 2112444.85
 78238.68

5.00 Mile
 From 65 to 66

Effects of Earthwork { 95279580 7622245 496034 07 103469.75
 or Cypars 35288.73 28230.46 18371.63 3832.21
 2314522.07
 85723.04

66 to 67	330	9.605	62.42	3	50.42	3	38.42	3
67 to 68	330	10.75	67.00	3	55.00	3	43.00	3
68 to 69	330	10.265	65.06	3	53.06	3	41.06	3
69 to 70	330	9.735	62.94	3	50.94	3	38.94	3
70 to 71	330	9.785	63.14	3	61.14	3	39.14	3
71 to 72	330	9.73	62.92	3	50.92	3	38.92	3
72 to 73	330	8.81	59.24	3	47.24	3	35.24	2.81
73 to 74	330	8.295	57.18	3	45.18	3	34.89	2.295
74 to 75	330	8.18	56.72	3	44.72	3	34.56	2.18
75 to 76	330	7.84	55.36	3	43.36	3	33.68	1.84
76 to 77	330	7.55	54.20	3	42.20	3	33.10	1.55
77 to 78	330	7.295	53.18	3	41.18	3	32.59	1.295
78 to 79	330	8.065	56.26	3	44.26	3	34.13	2.065

30.08 0.04	59558.40	47678.40	35798.40	3970.56	147005.76
31.21 0.605	61795.80	49915.80	38035.80	6231.07	155978.47
33.50 1.75	66330.00	54450.00	42570.00	19346.25	182696.25
32.53 1.265	64409.40	52529.40	40649.40	13579.64	171167.84
31.47 0.735	62310.60	50430.60	38550.60	7633.04	158924.84
31.57 0.785	62508.60	50628.60	38748.60	8178.20	160064.00
31.46 0.73	62290.80	50410.80	38550.80	7578.71	168811.11
" " " "	58647.60	46767.60	33030.42	"	138445.62
" " " "	56608.20	44728.20	26196.73	"	127533.13
" " " "	56152.80	44272.80	24718.68	"	125144.18
" " " "	54806.40	42926.40	20450.49	"	118183.29
" " " "	53658.00	41778.00	16930.65	"	112366.65
" " " "	52648.20	40768.20	13927.33	"	107343.73
" " " "	55697.40	43817.40	23267.88	"	122772.68

21.65 0.725	"	"	62271.00	50391.00	38511.00	7522.41	158697.41
"	"	"	59360.40	47480.40	35501.46	"	142342.26

State of	949053.60	758975.60	505408.14	74041.88	"	2287477.22
Earthwork						
— of Cyar &c	35150.13	28110.13	18718.82	2742.33	"	84721.41

370 4-775 43.10' . 3 33-55 1-775

" " " " 47841.00 22023.96 " " " " 69874.96.

500 2.28 34.56 2.28

39398.40 39398.40

225 2. 28 34.56 2.28

17729.28

225 2.28 34.56 2.28

17729.28

330 2.28.34.56 2.28

26002.94

330 2.28 34.56 2.28

26002.94 26002.94

330 9 92 21 11 0

26002.94

0400228

530 2.28 34.56 2.28

2000294

3.30 2.28 34.56 2.28

20002.94

330 2 28 34 56 9. 9. 9.

“ “ “ “ 26002-94 “ “ “ “ 26002-94

3.30 2.28 2.11

26002.94

44-602-28

26002 21

2.28 34.56 2.28

20002.94

330 2.28 34.56 2.28

2000294

30 2.28.34.56 2.30

2363.90 " " " " 2363.90

70 2.28 21.4 2.28

15 " " " " 5515.77 " " " " 5515.77

1000

8829.68

100 2.28 34.56 2.28

[Handwritten signature]

130 2-28 34.56 2.28

1024-00

1176118

330 3.635 38.54 3 31.27 0.685

8th Mile

From 118 to 119

370 3.92 39.68 3 31.84 0.92

119 to 120

470 3.92 39.68 3 31.84 0.92

120 to 121

200 3.92 39.68 3 31.84 0.92

121 to 122

330 3.92 39.68 3 31.84 0.92

122 to 123

270 3.92 39.68 3 31.84 0.92

123 to 124

110 3.92 39.68 3 31.84 0.92

124 to 125

100 4.075 40.30 3 32.15 1.075

125 to 126

120 3.405 37.62 3 30.81 0.405

126 to 127

300 2.58 35.16 2.58

127 to 128

225 3.12 36.48 3 30.24 0.12

128 to 129

155 5.165 44.66 3 34.33 2.165

129 to 130

330 7.315 53.26 3 41.26 3 32.68 1.315

130 to 131

330 7.665 54.66 3 42.66 3 33.38 1.665

131 to 132

330 6.31 49.24 3 37.24 3 30.62 0.31

132 to 133

330 5.37 45.48 3 36.74 2.37

133 to 134

330 4.94 43.76 3 33.88 1.94

134 to 135

330 4.375 41.50 3 32.75 1.375

135 to 136

330 4.415 41.66 3 32.83 1.415

38154.60 6552.62

14707.22

State of Earthwork

593544.60

59740.36

653284.96

or Cyant 21983.13 2212.60

24195.73

44044.80 10838.33

54883.13

55948 8013767.61

69716.41

23808 00 5858.56

29666.56

39283.20 9666.62

48949.82

52140.80 7909.05

40049.85

13094 40 3222.20

16316.60

12090.00 3456.12

15546.12

13543.20 1497.36

15040.56

27213.84

27213.84

24624.00 816.48

25440.48

26511.04 8703.52

32287.18

52727.40 40847.40 1415978

107734.58

54113 60 42233.60 18313 16

114659.96

48747.60 36867.60 3132.42

88747.62

45025.20 27170.15

72195.35

43322.60 21689.97

65012.37

41085.00 14860.31

55945.31

41243.40 15329.96

56573.36

136 to 137

330 4.77 43.08 3.0 33.50 1.77

9th mile
From 137 to 138

138 to 139

330 5.12 44.48 3.0 34.24 2.12

139 to 140

330 5.15 44.60 3.0 34.30 2.15

140 to 141

330 5.25 45.00 3.0 34.50 2.25

141 to 142

330 5.84 47.38 3.0 35.69 2.84

142 to 143

330 5.91 47.64 3.0 35.82 2.91

143 to 144

330 5.33 45.34 3.0 34.67 2.33

144 to 145

330 5.35 45.40 3.0 34.70 2.35

145 to 146

210 6.97 51.88 3.0 37.88 3.0 31.94 0.97

146 to 147

120 6.97 51.88 3.0 37.88 3.0 31.94 0.97

147 to 148

330 5.51 46.04 3.0 35.02 2.51

148 to 149

330 5.33 45.32 3.0 34.66 2.33

149 to 150

330 5.39 45.58 3.0 34.79 2.39

150 to 151

330 5.79 47.18 3.0 35.57 2.79

151 to 152

330 5.91 47.64 3.0 35.82 2.91

152 to 153

330 5.43 45.74 3.0 34.87 2.43

153 to 154

330 5.97 47.88 3.0 35.94 2.97

330 6.50 50.02 3.0 38.02 3.0 31.94 0.50

1264920195771

62239.91

Total cost of
Earth work

675671.54

287142.11

3560536

998219.01

one year

25017.47 0634 89 1318.71

36971.07

" " " "

44035.2 23954.30

67989.5

" " " "

44154.00 24335.85

68489.85

" " " "

44550.00 25616.25

70166.25

" " " "

46906.20 32507.55

79413.75

" " " "

47163.60 34397.94

81561.54

" " " "

44886.60 26714.96

71601.56

" " " "

44946.00 26907.85

71855.85

" " " "

32684.00 25124.40 6506.17

64314.57

" " " "

18676.80 14356.80 3717.81

36751.41

" " " "

45579.60 29007.06

74586.66

" " " "

44866.80 26650.07

71516.87

" " " "

45124.20 27496.27

72620.47

" " " "

46708.20 32826.43

79534.63

" " " "

47163.60 34397.94

81561.54

" " " "

45282.60 28019.78

73502.38

" " " "

47401.20 35224.79

82625.99

" " " "

49519.80 37639.80 5322.80

92482.40

Total cost of
Earth work

739648.40

485180.04

15546.78

1240375.22

27374.3817969.63 575.80
 45939.81

10th Mile

From 154 to 155	330	6.09	48.56	3-0	36.36	3-0	50 180.09
155 to 156	330	5.95	47.80	3-0	35.90	2-95	" "
156 to 157	330	5.67	46.68	3-0	35.34	2-67	" "
157 to 158	330	5.605	46.42	3-0	35.21	2-605	" "
158 to 159	330	5.665	46.66	3-0	35.35	2-665	" "
159 to 160	330	5.795	47.18	3-0	35.59	2-795	" "
160 to 161	330	5.78	47.12	3-0	35.56	2-78	" "
161 to 162	330	5.745	46.98	3-0	35.49	2-745	" "
162 to 163	330	5.855	47.42	3-0	35.71	2-855	" "
163 to 164	330	5.97	47.88	3-0	35.94	2-97	" "
164 to 165	330	6.655	50.62	3-0	38.62	3-0 31.310.655	" "
165 to 166	330	7.135	52.54	3-0	40.54	3-0 32.271.135	" "
166 to 167	330	6.755	51.02	3-0	39.02	3-0 31.510.755	" "
167 to 168	330	6.47	49.88	3-0	37.88	3-0 30.940.47	" "
168 to 169	330	6.665	50.66	3-0	38.66	3-0 31.330.665	" "
169 to 170	330	7.04	52.16	3-0	40.16	3-0 32.081.04	" "

"	"	"	"	47876.40	35996	40896.34	"	84769.14
"	"	"	"	47322.00	34948.65	"	"	82270.65
"	"	"	"	46213.2	31138.07	"	"	77351.27
"	"	"	"	45755.8	935353	"	"	55309.33
"	"	"	"	46193.4	31070.96	"	"	77264.36
"	"	"	"	46708.2	32826.43	"	"	79534.63
"	"	"	"	46648.8	32622.34	"	"	79271.14
"	"	"	"	46510.20	3214861	"	"	78658.81
"	"	"	"	46945.8	3364417	"	"	80589.97
"	"	"	"	47401.2	3522479	"	"	82625.99
"	"	"	"	50113.8	38233.8	6767.65	"	95115.25
"	"	"	"	52014.6	40134.6	1208672	"	104235.92
"	"	"	"	50509.8	38629.8	7850.71	"	96990.31
"	"	"	"	49381.20	37501.2	4798.79	"	91681.19
"	"	"	"	50153.4	38275.4	6875.36	"	95302.16
"	"	"	"	51638.4	39758.4	11009.85	"	102406.65

Total Cuts of Earthwork
 11586.20 54150515 5028542
 28577.26 20055.74 1862.42 50495.42

11th Mile

From 170 to 171	330	7.285	53.14	3-0	41.14	3-0	32.571.285
171 to 172	330	7.415	53.66	3-0	41.66	3-0	32.831.415

"	"	"	"	52608.6	40728.6	13811.3	"	107148.5
"	"	"	"	53123.4	41743.4	15329.96	"	109696.76

172 to 173.

173 to 174

174 to 175

175 to 176

176 to 177

177 to 178

178 to 179

179 to 180

180 to 181

181 to 182

182 to 183

183 to 184

184 to 185

185 to 186

330 7-12 52-48 3-0 60-48 3-0 32-24 1-12

330 6-36 49-44 3-0 37-44 3-0 30-20 0-36

300 4-11 40-44 3-0 32-22 1-11

200 2-24 34 48 2-24

410 2-24 34-48 2-24

410 2-24 34-48 2-24

330 2-24 34-48 2-24

330 2 24 34-48 2-24

330 2-24 34-48 2-24

330 2-24 34-48 2-24

330 2-24 34-48 2-24

330 2-24 34-48 2-24

330 2-24 34-48 2-24

330 2-24 34-48 2-24

330 2-24 34-48 2-24

51953.2 46075.2 11915.7

48945.60 37065.60 3649.53

36396.00 10729.26

75447.00

31666.43

31666.43

25487.61

25487.61

25487.61

25487.61

25487.61

25487.61

25487.61

25487.61

25487.61

103946.3

89660.73

47125.26

15447.04

31666.43

31666.43

25487.61

25487.61

25487.61

25487.61

25487.61

25487.61

25487.61

25487.61

25487.61

Total of Earthwork

525709.58

169842.06

44706.69

740258.33

or Cyars 19470.72 6290.44 1655.80

27416.96

12th Mile

From 186 to 187

187 to 188

188 to 189

189 to 190

190 to 191

191 to 192

192 to 193

193 to 194

194 to 195

330 2-24 34-48 2-24

330 2-495 34-99 2-495

100 2-75 35-50 2-75

100 2-75 35-50 2-75

100 2-75 35-50 2-75

360 2-75 35-50 2-75

330 2-75 35-50 2-75

330 2-75 35-50 2-75

330 2-75 35-50 2-75

330 2-75 35-50 2-75

25487.61

28809.01

9762.5

9762.5

9762.5

35145.0

32216.25

32216.25

32216.25

32216.25

25487.61

28809.01

9762.5

9762.5

9762.5

35145.0

32216.25

32216.25

32216.25

32216.25

195 to 196	330	2.75	35.50	2.75					32216.25		32216.25
196 to 197	330	2.825	35.65	2.825					33234.71		33234.71
197 to 198	330	2.9	35.8	2.9					34260.6		34260.6
198 to 199	330	2.9	35.8	2.9					34260.6		34260.6
199 to 200	330	2.9	35.8	2.9					34260.6		34260.6
200 to 201	330	2.9	35.8	2.9					34260.6		34260.6
201 to 202	330	2.9	35.8	2.9					34260.6		34260.6
202 to 203	330	2.9	35.8	2.9					34260.6		34260.6
203 to 204	330	2.9	35.8	2.9					34260.6		34260.6

Total Feet of Earthwork } 520653.03
 as per record 19283.44

13 th Mile											
From 204 to 205	330	2.90	35.80	2.90					34260.6		34260.6
205 to 206	330	2.90	35.80	2.90					34260.6		34260.6
206 to 207	270	4.125	41.5	3.0	3275	1.125			33615.0	9947.81	43562.81
207 to 208	270	5.85	47.4	3.0	35.7	2.85			38394.0	27471.15	65865.15
208 to 209	120	7.19	52.76	3.0	40.76	3.0	32.38	1.19	18993.6	14673.6	33667.2
209 to 210	45	8.09	56.36	3.0	44.36	3.0	34.18	2.09	7608.6	5988.6	13597.2
210 to 211	165	7.86	55.44	3.0	43.44	3.0	33.72	1.86	27442.8	21502.8	48945.6
211 to 212	165	8.005	56.02	3.0	44.02	3.0	34.01	2.005	27729.90	21789.90	49519.80
212 to 213	165	7.965	55.86	3.0	43.86	3.0	33.93	1.965	27650.70	21710.70	49361.40
213 to 214	165	7.49	53.96	3.0	41.96	3.0	32.98	1.49	26710.20	20770.20	47480.40
214 to 215	165	7.715	54.86	3.0	42.86	3.0	33.43	1.715	27155.70	21215.70	48371.40
215 to 216	165	7.65	54.60	3.0	42.60	3.0	33.30	1.65	27027.00	21087.00	48114.00
216 to 217	45	7.19	52.76	3.0	40.76	3.0	32.38	1.19	7122.60	5502.60	12625.20
217 to 218	60	6.685	50.74	3.0	38.74	3.0	31.37	0.685	9133.20	6973.20	16106.40

218 to 219	60	6.425	49.70	3-0	37.70	3-0	30.30-0.625
219 to 220	60	6.534	50.12	3-0	38.12	3-0	31.680 536
220 to 221	60	7.325	53.30	3-0	41.30	3-0	32.151.325
221 to 222	210	8.205	56.82	3-0	44.82	3-0	34.412 205
222 to 223	165	7.85	55.40	3-0	43.40	3-0	33.70 1.85
223 to 224	165	7.09	52.36	3-0	40.36	3-0	32.181.09
224 to 225	165	5.85	47.40	3-0	35.70	2.85	"
225 to 226	165	3.79	39.16	3-0	31.58	0.79	"
226 to 227	165	4.11	40.44	3-0	32.22	1.11	"
227 to 228	165	5.61	46.44	3-0	35.22	2.61	"
228 to 229	165	5.475	45.90	3-0	34.95	2.475	"
229 to 230	165	6.075	48.30	3-0	36.30	3-0	30.15 0.075
230 to 231	165	6.995	51.98	3-0	39.98	3-0	31.99 0.995
231 to 232	120	6.71	50.84	3-0	38.84	3-0	31.62 0.71
232 to 233	165	5.645	46.58	3-0	35.29	2.645	"
233 to 234	330	4.285	41.14	3-0	32.57	1.285	"
234 to 235	330	3.87	39.48	3-0	31.74	0.87	"

8946.00	6786.00	786.67	"	16518.67
9021.60	6861.60	995.42	"	16878.62
9594.00	7434.00	2596.67	"	19623.67
35796.60	28236.60	15933.55	"	79966.75
27423.00	21483.00	10286.92	"	59192.92
25918.20	19978.20	5787.57	"	51683.97
23463.00	16787.92	"	"	40250.92
9384.20	4116.45	"	"	13500.65
20017.80	5901.02	"	"	25918.88
22987.80	15167.49	"	"	38155.29
22720.50	14275.28	"	"	36995.78
23908.50	17968.50	373.10	"	42250.10
25730.10	19790.10	5251.95	"	50772.15
18302.40	13982.40	2676.98	"	34961.78
23057.10	15401.43	"	"	38458.53
40728.60	13811.30	"	"	54539.90
39085.20	7122.55	"	"	48197.75

Total Cuts of	33189.10	435727.16	114784.39	"	1283700.65
Earthwork				"	
— of Cuts	27155.15	16138.04	4251.27	"	47544.46

14th Mile

From 235 to 236	330	6.85	51.40	3-0	39.40	3-0	31.70 0.85
236 to 237	330	8.415	57.66	3-0	45.66	3-0	34.83 2.415
237 to 238	330	7.23	52.92	3-0	40.92	3-0	32.46 1.23
238 to 239	330	7.68	54.72	3-0	42.72	3-0	33.36 1.68
239 to 240	330	7.68	54.72	3-0	42.72	3-0	33.36 1.68
240 to 241	330	6.165	48.66	3-0	36.66	3-0	30.33 0.165

50886.00	39006.00	8891.85	"	98783.85
57083.00	45203.60	27757.76	"	130044.16
52390.80	40510.80	13175.51	"	106077.11
54172.80	42292.80	18494.68	"	114960.28
54172.80	42292.80	18494.68	"	114960.28
48173.40	36293.40	1651.46	"	86118.26

241 to 242	330	6.15	48.60	3-0	36.60	3 0	30.30	0.15
242 to 243	330	7.11	52.44	3-0	40.44	3-0	32.22	1.11
243 to 244	330	6.595	50.38	3-0	38.38	3-0	31.19	0.595
244 to 245	330	5.305	45.22	3-0	34.61	2.305		
245 to 246	330	5.31	45.24	3-0	34.62	2.31		
246 to 247	330	7.59	54.36	3-0	42.36	3-0	33.18	1.59
247 to 248	330	8.34	57.36	3-0	45.36	3-0	34.68	2.34
248 to 249	330	6.50	50.00	3-0	38.00	3-0	31.00	0.50
249 to 250	330	6.195	48.78	3-0	36.78	3-0	30.39	0.195
250 to 251	330	7.01	52.04	3-0	40.04	3-0	32.02	1.01

45114.00	36234.00	11499.85	85847.85
51915.60	40035.60	11802.18	103753.38
49876.20	37796.20	6124.15	93996.55
44767.80	26326.09		71093.89
44787.60	26390.82		71178.42
53316.40	41936.40	17409.52	113162.34
56786.40	44906.40	26777.89	128472.69
49500.00	37620.00	5115.00	92235.00
48292.20	36412.20	1955.59	86659.99
51519.60	37639.60	10672.26	101831.46

Total Cfe. to	316254.60	613096.51	169824.40	1599175.51
Earthwork				
at Cyano	30231.65	22707.27	6289.79	59228.71

15th Mile

From 251 to 252	330	7.435	53.74	3	41.74	3	32.57	1.435
252 to 253	330	7.49	53.96	3	41.96	3	32.98	1.49
253 to 254	330	7.80	55.20	3	43.20	3	33.60	1.80
254 to 255	330	8.825	59.30	3	47.30	3	35.65	2.825
255 to 256	330	8.605	58.42	3	46.42	3	35.21	2.605
256 to 257	330	8.48	57.92	3	45.92	3	34.96	2.48
257 to 258	330	9.385	61.52	3	49.52	3	37.52	3.385
258 to 259	330	9.825	63.30	3	51.30	3	39.30	3.825
259 to 260	330	10.095	64.38	3	52.38	3	40.38	3.095
260 to 261	330	8.96	59.84	3	47.84	3	35.92	2.96
261 to 262	330	6.955	51.82	3	39.82	3	31.91	0.955
262 to 263	330	6.365	49.46	3	37.46	3	30.73	0.365
263 to 264	165	7.205	52.82	3	40.82	3	32.41	1.205

53202.60	41322.60	15565.88	110090.78
53420.40	41530.40	16216.26	111177.06
54648.00	42768.00	14958.40	117374.40
58707.00	46827.00	33234.71	138768.71
57835.80	45755.80	30268.27	134059.87
57340.80	45460.80	28611.26	131412.86
60924.60	49044.60	37164.60	151043.12
62667.00	50787.00	38907.00	160977.71
63736.20	51856.20	39976.20	167200.45
59241.60	47361.60	35086.65	141689.85
51301.80	39421.80	10056.43	100780.03
48765.40	37085.40	3701.42	89752.22
26145.90	20205.90	6443.91	52795.71

264 to 265	165	7.775	55.01	3	43.05	3	33.65	1.775
265 to 266	165	7.44	53.76	3	41.76	3	32.88	1.44
266 to 267	165	7.285	53.14	3	41.14	3	32.57	1.285
267 to 268	165	7.41	53.64	3	41.64	3	32.82	1.41
268 to 269	165	7.785	55.14	3	43.14	3	33.57	1.785
269 to 270	165	7.985	55.94	3	43.94	3	33.97	1.985
270 to 271	165	8.935	59.74	3	47.74	3	35.87	2.935

272 to 273	272	29.95	21.309	75	9825	95	58365.65
266 to 267	266	11.20	20671	20	7812	28	55094.68
263 to 264	263	01.30	20364	30	6905	65	53571.25
265 to 266	265	51.80	20611	80	7635	57	54799.17
272 to 273	272	94.30	21354	30	9887	20	58535.80
276 to 277	276	90.30	21730	30	11126	02	60566.62
295 to 296	295	71.30	23631	30	17370	94	70573.52

Total Effects of Earthquake
 33310.63 26271.48 14287.19 894.73 2018629.48
 74764.03

16th Mile

From 271 to 272	165	9.015	60.06	3	48.06	3	36.06	3
272 to 273	165	8.24	56.96	3	44.96	3	34.48	2.24
273 to 274	165	8.12	56.48	3	44.48	3	34.24	2.12
274 to 275	165	7.98	55.92	3	43.92	3	33.96	1.98
275 to 276	165	8.90	59.60	3	47.60	3	35.80	2.90
276 to 277	165	9.28	61.12	3	49.12	3	37.12	3
277 to 278	165	8.565	58.26	3	46.26	3	35.13	2.565
278 to 279	165	8.16	56.64	3	44.64	3	34.32	2.16
279 to 280	165	8.11	56.44	3	44.44	3	34.22	2.11
280 to 281	165	8.555	58.22	3	46.22	3	35.11	2.555
281 to 282	165	9.395	61.58	3	49.58	3	37.58	3
282 to 283	165	9.745	62.98	3	50.98	3	38.98	3
283 to 284	165	10.665	66.66	3	54.66	3	42.66	3
284 to 285	165	11.625	70.50	3	58.50	3	46.50	3
285 to 286	165	10.755	67.02	3	55.02	3	43.02	3
286 to 287	165	10.79	67.16	3	55.16	3	43.16	3

30.03 0.015	"	"	29729.70	23780	70	17849	70	74 32	"	71434.42
"	"	"	28195.20	22255	20	12743	80	"	"	63094.20.
"	"	"	27957.60	22017.60	11977.15	"	"	"	"	61952.35
"	"	"	27680.40	21740.40	11094.73	"	"	"	"	60515.53.
"	"	"	29502.00	23562.00	17130.30	"	"	"	"	70194 30
30.56 0.28	"	"	30154.40	24314.40	18374.40	1411.87	"	"	"	74265.07
"	"	"	28838.70	22898	70	14940.89	"	"	"	66678.29
"	"	"	28036.80	22096.80	12231.66	"	"	"	"	62365 24
"	"	"	27937.80	21997	80	11913 69	"	"	"	61849.29
"	"	"	28818.90	22878.90	14801 49	"	"	"	"	66499.29
30.79 0.395	"	"	30482.10	24542.10	18602 10	2006 08	"	"	"	75632.38
31.49 0.745	"	"	31175 10	25235 10	19295 10	3870.90	"	"	"	79576.20
33 33 1.665	"	"	32996 70	27056.70	21116.70	9156 58	"	"	"	90326.68
35.25 2.625	"	"	34897.50	28957.50	23017 50	15267.65	"	"	"	102140.15
38.51 1.755	"	"	33174.90	27234.90	21294.90	9703.65	"	"	"	91408.35
33.58 1.79	"	"	33244.20	27304 20	21364.20	9917.85	"	"	"	91830 45

287 to 288	165	10.005	64.02	3	52.02	3	40.02	3	32.01	1.005	31689.90	25749.90	19809.90	6308.05	82557.75
288 to 289	165	8.565	58.26	3	46.26	3	35.13	2.565			28838.70	22898.70	14867.89		66605.29
289 to 290	165	8.395	57.58	3	45.58	3	34.79	2.395			28502.10	22562.10	13748.13		64812.33
290 to 291	165	8.33	57.32	3	45.32	3	34.66	2.33			28373.40	22433.40	13325.03		64131.83
291 to 292	330	8.585	58.34	3	46.34	3	35.17	2.585			57756.60	45876.60	30001.76		133634.96
292 to 293	330	8.965	59.86	3	47.86	3	35.43	2.965			59261.40	47331.40	35155.70		141798.50
293 to 294	330	9.45	61.80	3	49.80	3	37.80	3	30.90	0.45	61182.00	49302.00	37222.00	4588.65	152494.65
294 to 295	330	9.19	60.76	3	48.76	3	36.76	3	30.38	0.19	60152.40	48272.40	36392.40	1904.82	146722.02
295 to 296	330	9.505	62.02	3	50.02	3	38.02	3	31.01	0.505	61399.80	49519.80	37639.80	5167.81	153727.21
296 to 297	330	10.06	64.24	3	52.24	3	40.24	3	32.12	1.06	63597.60	51717.60	39837.60	11235.57	166388.37

Total Cft. of Earthwork $\left\{ \begin{array}{l} 963675.90 \\ 773586.90 \\ 545948.50 \\ 79613.80 \end{array} \right.$ 2362725.10
 as per $\left\{ \begin{array}{l} 35688.00 \\ 28651.37 \\ 20220.31 \\ 2948.66 \end{array} \right.$ 87508.34

17th mile

From 297 to 298	330	10.985	67.94	3	55.94	3	43.94	3	33.97	1.985	67260.60	55380.60	43500.60	22252.04	188393.84
298 to 299	330	11.61	70.44	3	58.44	3	46.44	3	35.22	2.61	69735.60	57855.60	45975.60	30334.98	203901.78
299 to 300	330	11.015	68.06	3	56.06	3	44.06	3	34.03	2.015	67377.40	55499.40	43619.40	22628.24	189126.44
300 to 301	330	10.575	66.30	3	54.30	3	42.30	3	33.15	1.575	65637.00	53757.00	41877.00	16268.17	177539.17
301 to 302	330	9.665	62.66	3	50.66	3	38.66	3	31.33	0.665	62033.40	50153.40	38273.00	6875.36	157335.16
302 to 303	330	8.65	58.20	3	46.20	3	35.10	2.55			57618.00	45738.00	29536.65		132892.65
303 to 304	120	8.00	56.00	3	44.00	3	36.00	2.00			20160.00	18340.00	8160.00		44160.00
304 to 305	120	8.05	56.20	3	44.20	3	34.10	2.05			20232.00	15912.00	8388.60		44532.60
305 to 306	300	8.55	58.20	3	46.20	3	35.10	2.55			52380.00	41580.00	26851.50		120811.50
306 to 307	120	8.95	59.80	3	47.80	3	35.90	2.95			21528.00	17208.00	12708.60		51444.60
307 to 308	330	5.985	47.94	3	35.97	2.985					47460.00	35432.24			82892.24
308 to 309	330	3.07	36.28	3	30.14	0.07					35917.20	696.23			36613.43
309 to 310	330	3.07	36.28	3	30.14	0.07					35917.20	696.23			36613.43

310 to 311	330	3.07	36.28	3	30.14	0.07	
311 to 312	330	3.07	36.28	3	30.14	0.07	
312 to 313	330	3.07	36.28	3	30.14	0.07	
313 to 314	430	6.105	48.42	3	36.42	3	30.21 0.105
314 to 315	230	7.57	54.28	3	42.28	3	33.14 1.105

35917.20	696.23			36613.43
35917.20	696.23			36613.43
35917.20	696.23			36613.43
62461.80	46981.80	1363.98		110807.58
37453.20	29173.20	8422.53		75048.93

Total Cpts of Parthurock

830925.00

523992.39

308677.46

98358.79

1761953.64

at Cyar & 80775.00 19407.12 11432.49 3642.91

65257.52

18th Mile

From 315 to 316	72	7.88	55.52	3	43.52	3	32.76 1.88
316 to 317	330	13.10	76.40	3	64.40	3	52.40 3
317 to 318	330	13.285	77.14	3	65.14	3	53.14 3
318 to 319	330	9.695	62.78	3	50.78	3	38.78 3
319 to 320	330	9.575	62.06	3	50.06	3	38.56 3
320 to 321	330	9.75	63.00	3	51.00	3	39.00 3
321 to 322	114	9.815	63.26	3	51.26	3	39.26 3
322 to 323	216	10.08	64.32	3	52.32	3	40.32 3
323 to 324	330	10.37	65.48	3	53.48	3	41.48 3
324 to 325	330	10.665	66.66	3	54.66	3	42.66 3
325 to 326	330	10.56	66.24	3	54.24	3	42.24 3
326 to 327	330	10.285	65.14	3	53.14	3	41.14 3
327 to 328	330	10.305	65.22	3	53.22	3	41.22 3
328 to 329	330	10.945	67.78	3	55.78	3	43.78 3

11992.32	9400.32	4567.75		25962.39
40.40	3	32.20	1.10	75636.00
63756.00	61876.00	39996.00	11688.60	242952.60
41.14	3	32.57	1.285	76368.60
64488.60	52608.60	40728.60	13811.30	248005.70
31.39	0.695			62152.20
50272.20	38392.20	7199.20		158015.80
31.03	0.515			61439.40
49589.40	37679.40	5273.54		163951.74
31.50	0.75			62370.00
50490.00	28610.00	7796.25		159266.25
31.63	0.815			21634.92
17530.92	13426.92	2938.74		55531.50
32.16	1.08			41679.36
33903.36	26127.36	7502.28		109212.36
32.74	1.37			64825.20
52945.20	41065.20	14801.75		173637.35
33.33	1.665			65993.40
54113.40	42233.40	18313.16		180653.36
33.12	1.56			65577.60
53697.60	41817.60	17050.17		178142.97
32.57	1.285			64488.60
52608.60	40728.60	13811.30		171637.10
32.61	1.305			64567.80
52687.80	40807.80	14043.49		172106.89
33.89	1.945			67102.20
55222.20	43342.20	21752.29		187418.89

329 to 330
330 to 331
331 to 332
332 to 333
333 to 334

330 11.48 69.92 3 57.92 3 45.92 3
102 11.425 69.70 3 57.70 3 45.70 3
232 11.375 69.50 3 57.50 3 45.50 3
330 11.25 69.00 3 57.00 3 45.00 3
254 10.44 65.76 3 53.76 3 41.76 3

3496 2.48 . 67220.80 57540.80 45460.80 28611.26 . 200633.66
3485 2.425 . 21328.20 17656.20 13984.20 8620.14 . 61588.74
3475 2.375 . 48372.00 40020.00 31668.00 19147.25 . 149207.25
3450 2.25 . 68310.00 56430.00 44550.00 25616.25 . 194906.25
32.88 1.44 . 50109.12 40966.12 31821.12 12026.18 . 134921.54

Total Cpts. to
Barthwick
Not Over
1063167.72
873087.72
680769.15
305227.85
25499.90
2947752.34
39376.58 32336.58 25213.67 11304.73 944.44 109176.00

19th Mile
From 334 to 335

335 to 336
336 to 337
337 to 338
338 to 339
339 to 340
340 to 341
341 to 342
342 to 343
343 to 344
344 to 345
345 to 346
346 to 347
347 to 348

76 9.66 62.64 3 50.64 3 38.64 3
330 9.23 60.92 3 48.92 3 36.92 3
330 8.885 59.52 3 47.52 3 35.77 2.885
330 9.42 61.68 3 49.68 3 37.68 3
330 7.485 53.94 3 41.94 3 32.97 1.485
330 5.10 44.40 3 34.20 2.10
98 5.10 44.40 3 34.20 2.10
232 5.10 44.40 3 34.20 2.10
330 4.675 42.70 3 33.35 1.675
100 3.88 39.52 3 31.76 0.88
100 3.38 37.52 3 30.76 0.38
100 3.155 36.62 3 30.31 0.155
100 2.32 34.64 2.32
100 4.545 42.18 3 33.09 1.545

31.32 0.66 . 14281.92 11545.92 8809.92 1571.01 . 36208.77
30.46 0.23 . 60310.80 48430.80 36550.80 2311.91 . 147604.31
" " . 53944.60 47064.60 34054.82 . 140064.02
30.84 0.42 . 61063.20 49182.20 37303.20 4274.42 . 151824.02
" " . 53400.60 41520.60 16156.94 . 111078.14
" " . 43956.00 37006.60 . 67656.60
" " . 13053.60 7038.36 . 20091.96
" " . 30902.40 16662.24 . 47564.64
" " . 42273.00 7428.71 . 49701.71
" " . 11856.00 2794.88 . 14650.88
" " . 11256.00 1168.88 . 12424.88
" " . 10986.00 469.80 . 11455.80
" " . 8036.48 . 8036.48
" " . 12654.00 5712.40 . 17766.40

348 to 349	500	6 67	50 68	3	38.68	3	31.38 0.67	76020.00 58020.00 10498.90	144538.90
349 to 350	209	6.005	48.002	3	36 002	3	30.01 0.005	30097 2522573.25 31.36	52701.86
350 to 351	209	5935	47.74	3	35.87	2.935		29932.98 22003.19	51936.17
351 to 352	330	5.805	47 22	3	35.61	2.805		46747.80 32962.39	79710.19
352 to 353	330	6.105	48.42	3	36.42	3	30.21 0 105	47735.80 36055.80 1046.77	85038.37
353 to 354	330	6.22	48.88	3	36 88	3	30 44 0.22	48391 20 36511.20 220994	87112.34
354 to 355	330	8.11	56.44	3	44 44	3	34 22 2.11	55875 6043995.60 23827 38	123698.58
355 to 356	156	9.61	62 44	3	50 44	3	38 44 3 31.22 0.61	29221 9223605.92 17989 92 2970 89	73788.65

Total of
 Earthwork $\left\{ \begin{array}{l} 197197.15 \\ 537848.34 \\ 188479.95 \\ 11128.23 \\ 1534653.67 \end{array} \right.$
 at Capas $\frac{2952582}{19920.30} \frac{6980.73}{412.15}$ 56839.00

20th Mile

From 356 to 357	174	9 15	60.60	3	48 60	3	36.60 3	30 30 0.15	31633 20 25369.20 19105 20 790.83	76898.43
357 to 358	330	9.06	60.24	3	48 24	3	36 24 3	30 12 0.06	59637 60 47757 60 35877 10 596.37	143869.17
358 to 359	180	9.25	61.00	3	49.00	3	37 00 3	30 50 0.25	32640 00 26460.00 19980.00 1372.50	80452.50
359 to 360	180	9 48	61.92	3	49 92	3	37 92 3	30.96 0 48	33436 80 26956.80 20496 80 2674.94	83565.34
360 to 361	330	9.815	63.26	3	51.26	3	39 26 3	31 63 0.815	62627.40 50747.40 38867.40 8506.88	160749.08
361 to 362	330	10.075	64 30	3	52 30	3	40 30 3	32.15 1.075	63657.00 51777.00 39897.00 11405.21	166736.21
362 to 363	300	10.39	65 36	3	53.56	3	41.56 3	32 78 1.39	59004.00 48204.00 37404 00 13669.26	158281.26
363 to 364	360	10.625	66.50	3	54.50	3	42 50 3	33.25 1.625	71820.00 58860.00 45900.00 19451.25	196031.25
364 to 365	330	10.42	65.68	3	53 68	3	41.68 3	32.84 1.42	65023 20 53140.20 41260.20 15388.82	174818.42
365 to 366	330	9.36	61.44	3	49 44	3	37 44 3	30.72 0.36	60825.60 48745 60 37065.60 3649.53	150486.33

366 to 367
367 to 368
368 to 369
369 to 370
370 to 371
371 to 372
372 to 373
373 to 374
374 to 375

330 8.535 58.14 3 46.14 3 35.07 2.535
330 9.195 60.78 3 48.78 3 36.78 3 30.39 0.195
480 9.53 62.12 3 50.12 3 38.12 3 31.06 0.53
480 9.745 62.98 3 50.98 3 38.98 3 31.49 0.745
330 9.305 61.22 3 49.22 3 37.22 3 30.61 0.305
100 8.11 56.44 3 44.44 3 34.22 2.11
100 6.26 49.04 3 37.04 3 30.52 0.26
130 6.21 48.84 3 36.84 3 30.42 0.21
156 8.91 59.64 3 47.64 3 35.82 2.91

57558.60 48678.60 27337.80
60172.20 48292.20 36412.20 1955.59
89452.80 72172.80 54892.80 7901.66
90691.20 70411.20 56131.20 11260.82
60607.80 48727.80 36847.80 3080.89
16932.00 13332.00 7220.42
14712.00 11112.00 793.52
19047.60 14367.60 830.46
27911.52 22295.52 16260.84

43
132375.00
146832.19
224420.06
231494.42
149264.29
37484.42
26617.52
34245.66
66467.88

Stat feet of
Earthwork
977390.52
787610.52
574583.84
101704.55
2441289.43
90418.12
26199.65 29170.76 21280.88 3766.83

21st Mile

From 375 to 376
376 to 377
377 to 378
378 to 379
379 to 380
380 to 381
381 to 382
382 to 383
383 to 384

174 10.26 65.04 3 53.04 3 41.04 3 32.52 1.26
330 10.085 64.34 3 52.34 3 40.34 3 32.17 1.085
330 10.18 64.72 3 52.72 3 40.72 3 32.36 1.18
330 10.095 64.38 3 52.38 3 40.38 3 32.19 1.095
330 6.585 50.34 3 38.34 3 31.17 0.585
330 2.93 35.86 2.93
330 2.43 34.86 2.43
330 2.43 34.86 2.43
330 2.415 34.83 2.415

33950.88 27686.88 21422.88 7127.68
63696.60 51816.60 39926.60 11518.46
64072.80 52192.80 40312.80 12600.98
63736.20 51816.20 39976.20 11631.85
49836.60 37956.60 6017.36
34675.83
27954.23
27954.23
27957.76

90190.32
166968.26
169179.38
167200.45
93810.56
34675.83
27954.23
27954.23
27957.76

384 to 385	330	2.40	34.80	2.40
385 to 386	330	2.40	34.80	2.40
386 to 387	330	2.40	34.80	2.40
387 to 388	330	2.40	34.80	2.40
388 to 389	330	3.66	38.64	3 31.32 0.66
389 to 390	330	4.835	43.34	3 33.67 1.835
390 to 391	330	4.715	42.86	3 33.43 1.715
391 to 392	166	3.66	38.64	3 31.32 0.66

27561.60	27561.60
27561.60	27561.60
27561.60	27561.60
27561.60	27561.60
27561.60	45074.85
38233.56682149	63295.46
42906.60 20388.86	61351.10
42431.40 18919.70	21308.22
18083.52 8224.70	

Total feet of Earthwork

64553.61 270863.83 147665.84 42880.97 1106964.25

and Cyars 23909.37 10031.99 5469.10 1588.18 40998.66

22nd Mile

From 392 to 393	144	2.64	35.28	2.64
393 to 394	330	1.64	33.28	1.64
394 to 395	330	0.64	31.28	0.64
395 to 396	300	0.64	31.28	0.64
396 to 397	360	0.67	31.34	0.67
397 to 398	360	0.70	31.40	0.70
398 to 399	238	0.70	31.40	0.70
399 to 400	590	0.70	31.40	0.70
400 to 401	132	0.70	31.40	0.70
401 to 402	458	0.70	31.40	0.70
402 to 403	302	0.70	31.40	0.70

13412.04	13412.04
18011.13	18011.13
6606.33	6606.33
6005.76	6005.76
7559.20	7559.20
7912.80	7912.80
5231.24	5231.24
12968.20	12968.20
2901.36	2901.36
10066.84	10066.84
6637.96	6637.96

403 to 404	226	2.15	34.30	2.15			
404 to 405	330	4.34	54.38	3	32.69	1.34	5
405 to 406	217	4.96	54.86	3	33.93	1.96	5
406 to 407	217	4.96	54.86	3	33.93	1.96	5
407 to 408	330	7.74	54.96	3	42.96	3	33.48 1.74
408 to 409	330	9.78	63.12	3	51.12	3	39.12 3
409 to 410	230	8.26	57.04	3	45.04	3	34.52 2.26

16666.37	16666.37
40966.20 14309.45	55475.65
28552.86 14467.92	43020.78
28552.86 14467.92	43020.78
54410.40 42530.40 1922.421	116165.01
62488.80 50608.80 38728.80 8123.54	159949.94
37357.60 31077.60 17943.49	88378.69

Total Feet of Earthwork

or Cyan 13641.03 6209.70 2810.98 300.87

368307.95
167662.09
75896.50
8123.54
619990.08
22962.58

23rd Mile

From 410 to 411	430	7.10	52.40	3	40.40	3	32.20 1.10
411 to 412	330	6.67	50.68	3	38.68	3	31.34 0.67
412 to 413	330	7.20	52.80	3	40.80	3	32.40 1.20
413 to 414	100	8.00	56.02	3	44.02	3	34.01 2.00
414 to 415	100	5.86	47.44	3	35.72	2.86	
415 to 416	50	3.46	37.84	3	30.92	0.46	
416 to 417	50	2.95	35.90	2.95			
417 to 418	200	2.45	34.90	2.45			
418 to 419	200	2.00	34.00	2.00			
419 to 420	200	1.67	33.35	1.67			
420 to 421	100	1.57	33.15	1.57			

67596.00 52116.00 15230.60	134942.60
50173.20 38293.20 6929.27	95395.67
52272.00 40392.00 12830.40	105494.40
16806.00 3206.00 6819.00	36831.00
14232.00 10215.92	24447.92
5676.00 711.16	6387.16
5296.25	5296.25
17101.00	17101.00
13600.00	13600.00
11172.25	11172.25
5221.12	5221.12

421 to 422	100	1 65	33.30	1.65			
422 to 423	100	2.10	34.20	2.10			
423 to 424	40	3 01	36.04	3	30 02	0.01	
424 to 425	230	4.50	42.00	3	33 00	1.50	
425 to 426	230	4.70	42.80	3	33.40	1.70	
426 to 427	305	4.055	40.22	3	32.11	1.055	
427 to 428	305	4.095	40.38	3	32.19	1.095	
428 to 429	495	4.12	40.48	3	32.24	1.12	
429 to 430	495	4.24	40.96	3	32.48	1.24	
430 to 431	320	4.53	42.12	3	33 06	1.53	
431 to 432	340	4.94	43.76	3	33.88	1.94	
432 to 433	230	5.04	44.16	3	34.08	2.04	

3494.50	5474.50
7182.00	7182.00
4326.80 12.00	4338.80
28780.00 11385.00	40365.00
27532.00 13059.40	42591.40
36801.30 10332.19	47133.49
36947.70 10750.65	47698.35
60112.80 17275.85	77988.65
60825.60 19926.22	80761.82
40435 2016186.17	56621.37
44635.20 22347.25	66982.45
30570.40 15990.33	46460.73

Total Cost of Earthwork \$644886.32
 as per 25884.67 10844711548.49 36277.87
 292807.19 41809.27 919502.78

2 1/2 mile

From 433 to 434

430	5.245	44.78	3	34.49	2 245		
434 to 435	330	6.49	49.96	3	37.96	3	30 98 0.49
435 to 436	330	7.14	52.56	3	40.56	3	32.28 1.14
436 to 437	330	6.915	51.64	3	39.66	3	31.83 0.915
437 to 438	330	7.005	52.02	3	40.02	3	32.01 1.005
438 to 439	330	7.43	53.72	3	41.72	3	32.86 1.43
439 to 440	330	5.575	46.30	3	35.15	2.575	

58024.20	33294.92	91319.12
49460.40	37580.40	5009.46
52034.40	40154.40	12143.73
57143.40	39263.40	9611.06
51499.80	39619.80	10616.11
53182.80	41302.80	15606.63
45837.00	29868.71	75705.71

440 to 441	330	3.665	38.66	3.31	31.33	0.665
441 to 442	330	2.88	35.76	2.88		
442 to 443	330	1.77	33.54	1.77		
443 to 444	330	1.77	33.54	1.77		
444 to 445	330	1.77	33.54	1.77		
445 to 446	330	1.77	33.54	1.77		
446 to 447	330	1.77	33.54	1.77		
447 to 448	330	1.77	33.54	1.77		
448 to 449	230	1.77	33.54	1.77		

38273.40 6875.36

45148.76

33986.30

33986.30

19590.71

19590.71

19590.71

19590.71

19590.71

19590.71

19590.71

19590.71

19590.71

19590.71

19590.71

19590.71

13544.13

13544.13

Total Cost of Earthwork

564530.09

267959.79

52886.99

885376.87

as Cyards

20908.52

9924

43195877

32791.72

25th Mile

From 449 to 450 300 1.77 33.54 1.77

450 to 451 424 1.77 33.54 1.77

451 to 452 424 1.77 33.54 1.77

17809.74

17809.74

25171.09

25171.09

25171.09

25171.09

Total Cost of Earthwork

68151.92

68151.92

as Cyards

2524.14

2524.14

Compensation for Land

Drainage Channels as per separate Estimate

10 Ferry Boats as per separate Estimate

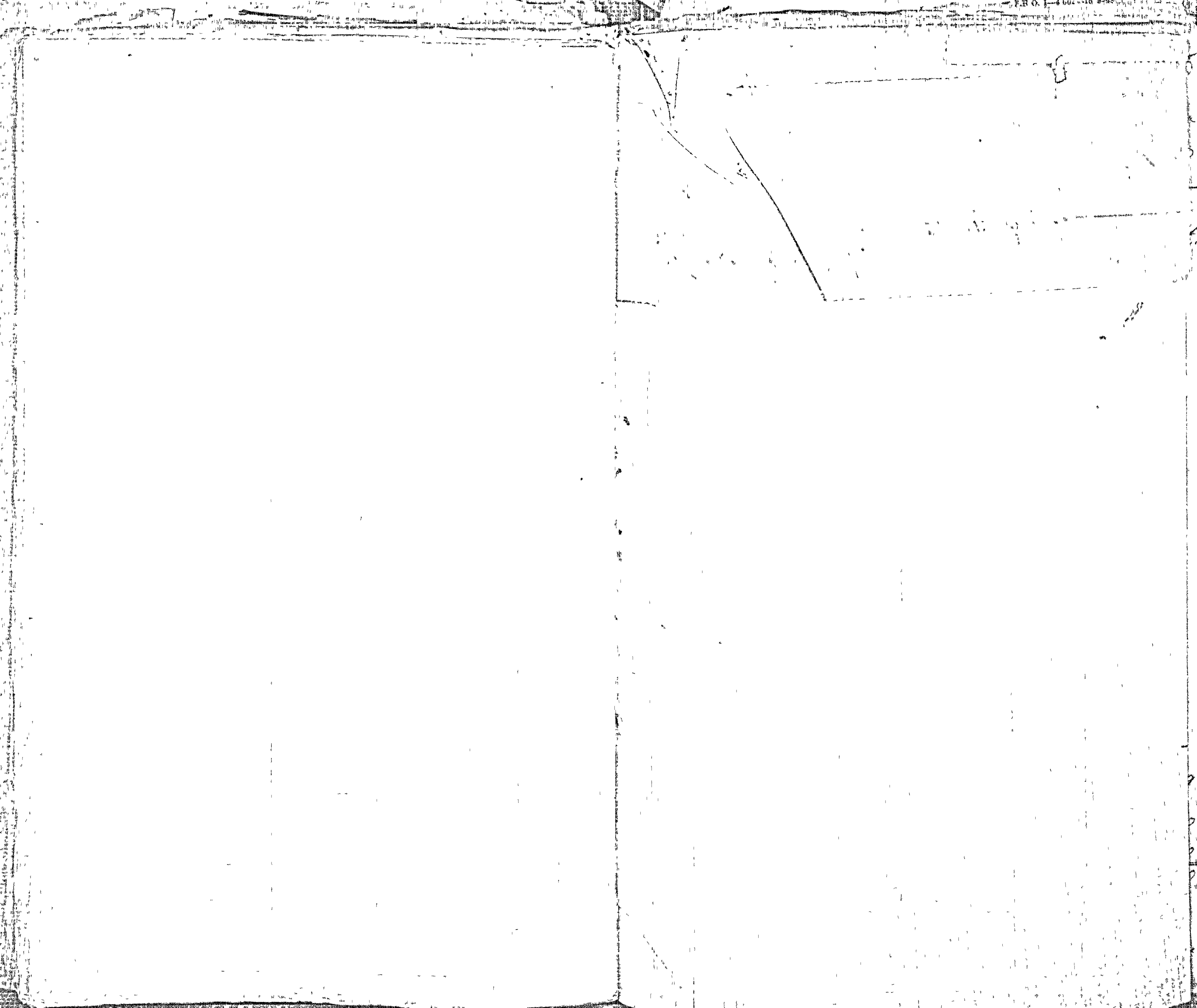
Superintendence Sundry and miscellaneous

contingencies

District Engineer's
Office
Bellore
8th February 1870

W.
C.
Compared by Magharah
(draughtsman)

G. N. R.
District Engineer



Enclosure in
letter No 108 of
8th February 1875
from the District
Engineer, of Malabar
to the Secretary
of the Government
P. W. D. Malabar.

Detailed Estimate
No 30 of 1874/75
Extension of the Canal
from the Kundaalain to
the Pannai.

11015
2 / 75

G.O. No. 814 of 23-3-75

Abstract Estimate
East Coast Canal (Pannai) from District
to Kundaalain to the Pannai
Abstract Estimate of the Cost of the proposed
Drainage Canals.

Quantities	Description of work	Rate	Amount	Total
5749	Drainage in 3 rd mile	1 1/2 0 16	538 15 6	
4736	Do in 4 th mile	1 1/2 0 16	444 0 0	
7426	Do in 5 th mile	1 1/2 0 16	696 3 0	
6745	Do in 8 th mile	2 1/2 0 16	1264 11 0	
2492	Do in 9 th mile	2 1/2 0 16	467 4 0	
1068	Do in 10 th mile	2 1/2 0 16	200 4 0	
2504	Do in 11 th mile	2 1/2 0 16	469 8 0	
1184	Do in 13 th mile	2 1/2 0 16	222 0 0	
4472	Do in 14 th mile	1 1/2 0 16	419 4 0	
3592	Do in 15 th mile	1 1/2 0 16	336 12 0	
422	Do in 16 th mile	1 1/2 0 16	39 9 0	
3070	Do in 17 th mile	1 1/2 0 16	287 13 0	
4081	Do in 18 th mile	2 1/2 0 16	755 13 0	
1111	Do in 19 th mile	2 1/2 0 16	208 5 0	
4385	Do in 20 th mile	1 1/2 0 16	411 16 0	
413	Do in 23 rd mile	2 1/2 0 16	77 7 0	18397

Compensation
20 Acres of M. to land . . . 40 . . . 800 . . . 800 0
Superintendence & minor . . . 160 9
Total Estimate . . . 7800 0

District Engineer's Office
Malabar
8th February 1875

[Signature]
District Engineer

Detailed Estimate

57

East Coast from the Trinidad to the River
Detailed Estimate of side Channels for discharging
the local drainage into the Backwaters.

Particulars of Work	Measurements in Feet		Depth	Cubic ft.	Cubic yds.	Cubic ft.	Cubic yds.
	Length	Breadth					

Sheet No. 3.

Drainage Channel from	1320	150	0.784	1552.32	5749.33
5.59 to 5.74					

Sheet No. 4.

Drainage Channel from	660	75	0.745	3687.50	1365.23
5.77 to 5.94					
Do Do from 8.45 to 8.50	1611	60	0.65	62829	2327.00
Do Do from 8.50 to 9.00	559	60	0.84	28173.60	1043.46
Total Cubic yards of 4 th Mile					4736.29

Sheet No. 5.

Drainage Channel from	2113	60	0.946	119933.89	4441.99
9 to 8.66					
Do Do from 7.39 to 7.00	1046	75	1.027	80562.15	2984.00
Total Cubic yards of 5 th Mile					7425.99

Sheet No. 8.

Drainage Channel from	1576	90	1.284	182122.56	6745.28
4.50 to 5.00					

Sheet No. 9.

Drainage Channel from	1255	75	0.695	46541.87	1725.62
5.37 to 5.63					
Do Do from 5.00 to 5.44	577	60	0.598	20702.76	766.77
Total Cubic yards of 9 th Mile					2492.39

Sheet 10

Drainage Channel from
5.644 to 5.81 } 660 60 0.269 1052.40 374.50

Do Do from 6.50 to 6.81 } 551 75 0.44 1038.00 678.44

Total Cys of 10th mile } 1067.97

Sheet 11

Drainage Channel from
6.34 to 6 } 1138 75 0.772 6757.20 2505.60

Sheet 12

Drainage Channel from
8 to 8.62 } 102 30 .09 275.40 10.20

Do Do from 8.058 to 8.088 } 144 30 .112 507.76 18.98

Do Do from 8.30 to 8.32 } 100 30 .15 450.00 16.66

Do Do from 5 to 4.50 } 1070 30 0.74 30738 1160.46

Total Cys of 13th mile } 1154.18

Sheet 13

Drainage Channel from
6.50 to 6.87 } 1522 60 0.975 8751.30 3228.90

Do Do from 6.746 to 6.816 } 564 60 0.166 5617.40 208.05

Do Do from 6.921 to 7.00 } 670 60 0.67 2794.00 1035.00

Total Cys of 14th mile } 1447.95

Sheet 14

Drainage Channel from
7.50 to 7.79 } 2572 30 1.238 9296.50 3448.61

Do Do from 7.91 to 8.00 } 187 30 .056 511.16 11.63

Do Do from 8 to 8.152 } 228 30 .50 5692.60 136.80

Total Cys of 15th mile } 3077.46

Sheet 15

Drainage Channel from
8 to 9.03 } 903 30 .076 2052.84 76.25

Do Do from 9.00 to 8.95 } 779 30 0.40 9342.00 346.22

Total Cys of 16th mile } 422.47

Sheet 17

57

Drainage Channel from
9.15 to 8.50 } 1820 30 1.51 82897.00 3070.33

Sheet 18

Drainage Channel from
10 to 9.37 } 3384 30 1.072 108829.44 4050.72

Sheet 19

Drainage Channel from
9.25 to 9 } 521 30 0.369 5767.47 213.61

Do Do from 8.88 to 8.50 } 536 45 0.615 14778.45 547.36

Do Do from 8.50 to 8.55 } 288 45 0.735 9525.60 352.80

Total Cys of 17th mile } 1113.76

Sheet 20

Drainage Channel from
8.55 to 9 } 2735 45 0.462 118398.15 4385.11

Sheet 21

Drainage Channel from
6.00 to 5.50 } 442 24 1.05 11158.40 412.52

Enclosure in a letter to 108 dated
8th Feb. 1875 from the
Engineer, letter to the Hon.
Rajagovindan, Public Works
Madras.

Mr 1015/75.

G. B. No 814 12-3-75

Abstract estimate
East Coast Canal from the
Kundalaim to the main
Abstract estimate of the cost of
the proposed drainage channel

Detailed Estimate

61

Koller District

Work - Constructing a Teak Ferry Boat 15' 3" x 9'
for the East Coast Canal.

Particulars of Work	Number	Measurement				Superficial Contents
		Length	Breadth	Depth	Cubical Contents	
<u>Wood Work</u>						
Frames	6	11' 3" 0'	2' 0'	3' 3" 6"		
Kelson in centre	1	11' 0" 0'	3' 0'	6' 2" 3"		
Do at ends	2	11' 0" 0'	4' 0'	3' 8"		
Stem pieces for Kelson	6	3' 3" 0'	5' 0'	2' 0" 3"		
Do beams at top	2	9' 0" 0'	6' 0'	2' 3"		
Supports over Kelson	6	1' 9" 0'	2' 0'	5' 0" 11"		
Beams over supports	6	9' 0" 0'	2' 0'	2' 9" 3"		
Uprights & railings	12	1' 6" 0'	2' 0'	3' 0" 11"		
Railings	2	17' 0" 0'	3' 0'	2' 2" 11"		
Total Cft of Teakwood -						21-1 1/2
						or 21 1/2

Planking 1 1/2" in thickness

Do Front and rear	2	13' 2"	2' 8"	70' 2 3/4"
Do at Ends	2	8' 0"	2' 8"	42' 8"
Do at Top	1	15' 8"	9' 0"	141' 0"
Do at bottom	1	10' 8"	7' 0"	74' 8"
Do at doors	2	2' 0"	2' 8"	10' 0"

Total Spft of Planking ————— 338-6 $\frac{1}{2}$

Iron Work

— Belt 7" long — 30 = 18 $\frac{1}{2}$

— Spikes for planking ————— 220

Total Iron work in lbs ————— 248

Caulking

— At top ————— 1 15 8 9-0 141-0

— At bottom ————— 1 10-8 7-0 74-8

— On sides in front and rear 1 26-4 2-8 70-2 $\frac{2}{3}$

— On — at ends ————— 1 16-0 3-8 58-8

Railings with supports ————— 58-0

Total Spft of Caulking ————— 402-6 $\frac{2}{3}$

in Spft of R ————— 4

Painting

— With 2 coats of Turpentine

— Front and rear ————— 26-3 2-8 70-0

— Sides ————— 16-0 3-8 58-8

— Bottom ————— 10-8 7-0 74-8

— Rails with uprights ————— 28-0

Total Painting Spft ————— 211-4

at square of do ————— 2-62

Abstract Estimate

63

Vellore District

Work — Constructing a Teak Ferry Boat 15 $\frac{1}{2}$ x 9' for the East Coast Canal —————

Quantity Description of charges Rate Amount Total

21 $\frac{1}{2}$ Cft. of Teak wood ————— 34- 69 14.

339 Spft. of Planking ————— " 74 155 6.

30-18 lbs of iron work for bolts — 3- 3 6.

230 lbs. Spikes for planking — 3- 113 2.

4 Spft. of caulking ————— 4 .. 16 ..

262 Do. of Tarring ————— 7- 18 55.

64 $\frac{1}{2}$ Cft. Labour for boat making 12- 72 9.

Contingencies ————— 21 57

Total Estimate Rupees ————— 400 ..

For 10 Ferry Boats at Rs. 400 ..
each ————— 4000 ..

District Engineer's Office
Vellore
8 $\frac{1}{2}$ February 1875

Smith
District Engineer

Enclosure in a letter to 108
dated 8th February 1875 from
the District Engineer of Victoria
to the Secretary to Government
Public Works Department & others

Mr. 1015/75.
4/75.

G.O. No 814 - 23-3-75

Constructing a Levee along Beach
18 $\frac{2}{3}$ x 9' for the East Coast Canal

65
- Specification to accompany the
Estimate for excavating the East
Coast Canal from the Sandalwood
to the Pinnacles in the Melbourne District
The bed of the Canal to be
4 $\frac{1}{2}$ feet below mean tide, and
to be 30 feet in breadth, at
this level. The sides slopes to
be 2 to 1
The spoil banks to be formed in
layers not exceeding one foot
in thickness. They will be put
into proper section and will
be neatly finished off. The tops
of these banks will slope
outwards (i.e. from the Canal)
at the rate of 1 in 40. The exact
quantity of spoil to be
deposited

deposited on each side of
the Canal, will be regulated
by the Officer in charge, at
the time of execution, and
will depend on the nature of
the soil; on the towing arrangements;
and on the maximum surface
level of the local drainage,
during the North-east Monsoon.
The sides slopes of the Canal,
where necessary, will be
planted with what is
locally called "Woola grass".
All trees and bushes on
the banks of the Canal, and
within the margins of the
area required for the spoil
banks, to be cut down and cleared.
A good towing path to be formed
and, whenever practicable, these
will

will be two - one on each side
of the Canal -
Where drainage cuts are
proposed, parallel to the Canal,
a clear space of not less than
30 yards to be left between the
outer toes of the spoil banks
and the inner margins of
the drains.

Leak Ferry Boats will be
provided at the following stations.

Intersection of Kallan and
Krisnapotam Road

Kottapalem

Kalatoor

Idara

Kantapilly

Kodara

Venkavapalem

Enclosure in a letter No. 108 dated
8th February 1875 from the District
Engineer of Bellary to the Secretary
to Government Public Works Dept.
Madras

District Engineer
 Office
 2 blocks -
 8th February 1875

J. Smith
 District Engineer

[Handwritten signature]

Mr. 1015/75

F. O. No 811, of 23-3-75

Specification to accompany
the Estimate for excavating the
East Coast Canal from the
Kundalain to the Ponnai
in the Nellore District.

108. District Engineer's Office
Bellare, 8th February 1875

From, Mr. Smith, Esquire
District Engineer of Bellare

To, Colonel G. W. Walker & Co. Esq.
Secretary to Government
Public Works Department
Fort St. George

Enclosures
4 Estimates
1 Specification
27 Drawings

Sir, I have the honor to forward
by D.M., the survey and sections
of the reach of the East Coast Canal,
between the Kundalair and the
Pannair, a distance of miles 24.27,
and to submit an Estimate
amounting to Rs. 274,000-0-0,
for the construction of that line
of navigation. The rates proposed
have been fixed with reference
to

to those allowed for, and prevailing
on the portion of the Canal now
under execution, and I have to add
that I believe them to be ample
but by no means excessive as
working on this line is, occasionally,
very difficult and discouraging.

2. The alignment of the Canal,
proposed in these papers, differs
but little from that contemplated
by Lieutenant (now Colonel)
Chambers R. E. 19 years ago.

Two modifications, only, are
really deserving of notice and
these I will now briefly refer to.

The first is near the mouth
of the Rindalaim; the second
is within the limits of the village
of Rosatoo. Colonel Chambers
intended making the Rindalaim
the line of navigation between
the points marked A and B, on
the --

the accompanying Sketch Map,
but I cannot disposed to ⁹³
recommenced that arrangement
and consider it would be
difficult to preserve a good
navigable passage in the
vicinity of C, as that outlet
is apparently sitting up.
Another objection to utilizing
the break B, of the Rindalaim,
is its proximity to the Bar
and the consequent risk
that boats would be exposed
to, during high floods in that
river. I therefore propose taking
off the Canal from the left bank
of the Rindalaim, at the point
marked D. This alignment will
be rather more expensive in the first
instance, than Colonel Chambers'
and it will entail the maintenance
of a ferry, in the line of the
Rindalaim.

Kristnapatnam Road but I am
convinced the modification is
very necessary if any approach
to a first class line of navigation
is contemplated at Roratoor.
I consider the Canal should
be taken more inland, than
originally intended, to avoid
the drift sand. In selecting
this line, on the East of the
Bengalown on the Roratoor
Beach, Colonel Chambers had,
apparently, two objects in view -
the preservation of direct
communication between the
Village and the Bengalown, and
the conservation of the adjacent
wet lands. He formerly proposed
to provide for a ferry boat
on the Canal and with reference
to

to the latter, it was no doubt
desirable, some years ago, to
forego many advantages, rather
than interfere with wet-
cultivation, but at the present
time, with a supply of water
available for the whole Pennair
Delta, I think a few acres
of rice land may be taken up,
for an important communication,
without much compensation or
inconvenience.

3 In connection with the
arrangements for navigation,
in the vicinity of Kristnapatnam,
the reach of the Kundalair,
from D to E, will be most
useful for the shallow heavy
traffic, as it is navigable at
all seasons. It

4. It will be observed that the proposed line joins the main or southern mouth of the Perma not far from the Bar; this is objectionable but it is the only suitable junction. In fact I think it would be impossible to find another that could be kept open for navigation, without a heavy expenditure annually.

5. In deciding on the alignment of the Canal it was necessary in parts, to avoid the cheapest line and to select one less likely to be silted up by the local drainage, or by the drift sand. The sand hills for some distance, north and south of the village of Kistnafatam, are

reported to be advancing at the rate of 2 or 3 yards annually, and I thought it absolutely necessary to leave a considerable margin between them and the Canal. North of Chernapillypalam the sand hills are comparatively low, and mostly covered with vegetation, and as I believe they will not give trouble, or add to the working expenses of the Canal, it has been set out rather close to them, where the adjoining ground is favorable. As there are only a few hamlets on the East of the Canal and as the traffic on the three existing roads will practically begin or end at the Canal, as the case may be.

he, I do not consider Bridges,
of any kind, necessary over this
section of the line. A simple
provision has, however, been
made, in the Estimate, for Ferry-
boats, capable of carrying cattle,
and Dandies, across the Canal
at all seasons. The wheeled
traffic is so very limited in
those parts that, with one
exception, it is scarcely deserving
of notice, but, as before stated,
arrangements have been made,
for maintaining speedy &
communication between the
narrow strip of land on the
East of the Canal, and the
villages on the West of it. The
exception alluded to is the
Kishnapatnam Road, on which
there is a moderate traffic, to the

the small Port of Kishnapatnam,
but the trade to that port,
by sea-going Boats, will be
so very much reduced, if it
does not cease altogether,
after the opening of the Canal,
that a ferry boat, of the description
proposed, would more than
suffice to meet the probable
future requirements of the
traffic intended for that particular
route.

The Bars, between the Hindolaim
and the River, in the immediate
vicinity of the proposed Canal,
are so small and so very seldom
open, that they will not interfere
with the navigation, to any
appreciable extent.

8. To present sitting, as much as

as possible, provision has been made, in the Estimate, for keeping the bulk of the local drainage out of the cuts, forming the Canal, between the several backwaters. The drainage, in all cases, except where the configuration of the country is favorable for admitting it into the artificial reaches of the Canal, be carried parallel to them, and discharged into the nearest, or most convenient, backwater.

9. Compensation has been allowed in the Estimate, for the destruction of the East of the Canal, as the area is too small to justify the expenditure that would be necessary to construct them required.

10. In conclusion I have to state that I very much regret the delay that has occurred in submitting the accompanying papers; endeavours were made to despatch them sooner but the press of work, ordinary and extraordinary, materially interfered with their preparation.

I have the honor to be
Sir,

Your Most Obedient Servant
Smith
District Engineer

W. H.

P. W. 1875 Sept.
No 108

From
The District Engineer
of the Core

To
The Secretary
to Government
P.W.D.

For
4-Em-...

dated 8th February 1875
Depd 10 — do —
Recd 15 — do —

G.O. 5th April 72 No 64-65.
" 28th June 73 — 560-564
" 15th — 74 — 218A-218B
" 26th July 74 — 535-537
" 27th Aug 74 — 685D, 685E
" 7th June 75 — 71-72

E. 32. { Enclosures 5 and
27 Drawings.

Forwarded by Roughly
the Survey and Section
of the project of the
East Coast Canal
between the Kundalain
and the Pennai,
and, a sum of Rs.
Estimated amounting
to Rupees 274,000
for the construction
of that line for
navigation.

G.O. No. 814-23. 3.75

No 559

GA-3-75

Pub. Works Dept.
Proceedings of the Madras Government
Read the following.

From the District Engineer
of Kellore } (M.R. No 108d/8th Feb 1875)
8/4

With the above letter
the District Engineer of Kellore
submits an estimate of
274,000 for extending the
East Coast Canal from
the Kundalain River near
Ristnapetam, to the Pennai
River below Kellore, a distance
of 20 1/2 miles. The section of
Canal extension already on
hand from Boogarazpetam
to Ristnapetam as an Es-
timate of Rs 287,000 have
been in G.O. No 274 of 28th
January 1873, is 20 1/2 miles
in length. The rate for
the work in the latter
estimate.

M.R.
6/3

17/3

Estimates ranged from $1\frac{1}{2}$ to 6 Annas per Cyp; while those of the present estimate range from $1\frac{3}{4}$ to $5\frac{1}{2}$ Annas; an extra allowance of 3 pie per Cyp for erecting the banks being made in both estimates.

The charges for providing a rippling drainage Channels, Compensation, and for Superintendence and Sundries, are higher than before; so that it would appear on the whole that the working rates do not exceed those estimates, and that actual experience gives reason to believe that a mileage rate of Rs 12500 will not be exceeded which for the entire length of 126 miles between Bhojgarazpatana and the Ristna District gives a total of $15\frac{3}{4}$ Lacs. The

the navigable Canals of the Ristna and Godavary. No adequate return either direct or indirect, can be expected till such connections shall have been made. It is therefore expedient on financial considerations alone, to persevere in the work, at least to double the rate of progress above mentioned. And the Ristna Engineers will report in what manner such rate of progress may be attained, without interfering with the other important works of the District; whether by concentration of more labor on the sections already surveyed and estimated; or by bringing in hand as far as possible other sections with labor drawn from fresh sources. The Ristna

District Engineer of the
 District is likewise called
 on to report the extent of work
 that has to be planned and
 estimated for in his District.

Copy

To The D. B. Stalkover
 " " " " " " " "
 " " " " " " " "
 " " " " " " " "
 " " " " " " " "
 " " " " " " " "

Sept 21-8-75

534-560

2. The deviation from the
 line of Canal originally
 proposed appears to be just-
 fied by the reasons given by
 Mr R. Smith. He proposes
 to dispense with Bridge on
 the Canal and to provide
 ferry boats only at Rithu
 Kulam, Kottapalem, Kela-
 loor, Selur, Rantapilly,
 Kachur, Kuthanapalem, Kora-
 tor, Inyand and Sathipalem,
 also to dispense with bridge
 over dykes for maintaining
 such cultivation as is to be
 between the Canal and the
 sea on the ground of the
 expense being disproportionate
 also to the amount of cul-
 tivation concerned. It may
 be found necessary here-
 after to modify the plan
 in part as the work proceeds.

In the present R.E.C. is dis-
 posed to acquiesce in this
 arrangement - and he also
 proposes

1. The collector will be instructed in the Revenue Department to investigate each case in time, and to report if he considers that its requirements have not been fully met.

3. As remarked in para 3 there is reason to suppose that the entire cost of extending the East Coast Canal to the Rictwa District will be about $15\frac{3}{4}$ Lakhs. Of which assuming $2\frac{3}{4}$ Lakhs as spent up to the end of 1874-75, and $3\frac{1}{4}$ Lakhs as the rate of Annual Outlay (both sums being overstates) it will take upwards of 17 years to complete so much of the project; after which there ~~will~~ ^{may} still remain a ^{few} miles to connect Madras with the

1015

V.

Dept. of 1870, Section
PUBLIC WORKS.

Ernest
Heller.

1870
1871
1872
1873
1874

1875

Ernest Heller
Treasury order on
1875 of \$27400.00
to the
San Francisco
San Francisco
San Francisco