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Marine (1897) Department.

✓ G.O., No. 1051-2 Mar

Dated 23 December 1897

15/12/97

[Despatch Abstract.]

Lights and Lighthouses; Passing orders on the Resys: Port Offrs's report on the working of the — on the Coasts of the Madras Resy: for 1896-97.

Lights and Lighthouses: Forwarding Copy of Procs: on the Resys: Port Offrs's Report on the working of the — on the Coasts of the Madras Presidency for 1896-97.

23.12.97

16.12.97

[M. 5 500—13-8-96.]

7/1/98

BACK PAPERS.

G.O.	No.	Department.	Date	G.O.	No	Department.	Date.
	766-7 Mar:	7-11-96					

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.
	1145 & 48						
	910-11 Mar:		31-10-98				

Government {1897} of Madras.

MARINE.

Recd. } 1897. *Enclosures*

Regd. *Spare copies*

G.O., Nos. 1051, 1052 23rd December 1897.

DECEMBER.

Lights and Lighthouses

Forwarding copy of Proceedings on the Presidency Port Officer's report on the working of the — on the coasts of the Madras Presidency for 1896–97.

GOVERNMENT OF MADRAS.

MARINE DEPARTMENT.

Read—the following paper :—

From Commander H. A. STREET, R.I.M., Presidency Port Officer, Madras, to the Secretary to Government, Marine Department, dated 20th October 1897, No. 1815/368 G.

I have the honour to forward, herewith, the annual report on the Lights and Lighthouses on the Coasts of this Presidency for the official year 1896–97.

Enclosure.

Report on the Lights and Lighthouses on the Coasts of the Madras Presidency for the official year 1896–97.

General Remarks.

The lights on the coast were displayed without interruption during the year, and the buildings appertaining thereto maintained in good order.

2. For the benefit of coasting vessels a fixed red light was brought into use at Hangarkotta, in South Canara. It is placed on a masonry column marking the northern limit of the port, and is displayed only during the busy season, viz., from 15th September to 31st May.

3. Heavy mineral oil was used at all the lights, except the Madras Harbour lights which used kerosine oil.

4. The total cost of maintaining the lighthouses during the year was Rs. 45,11[illegible] against Rs. 46,097 in the previous year, showing a decrease in charges of Rs. 985 (*see* statement and remarks under "Lighthouse charges").

Inspections.

See remarks in Appendix C.

Lightning Conductors.

See remarks in Appendix C.

Establishments.

Details of the Lighthouse staff are given in Appendix D and of cost in Appendix A.

Particulars of Lights.

See Appendix B.

Stores and Supplies.

These were well maintained. A comparative statement of expenditure of oil and stores during the year 1895–96 and 1896–97 is given in Appendix E.

Lighthouse Charges.

Appendix A affords particulars of charges for the year. The following is a comparative statement thereof for the past three years :—

—	1894-95.	1895-96.	1896-97.
	Rs.	Rs.	Rs.
Establishment, oil, stores and contingencies	43,907	34,390	35,034
Public Works charges	12,649	11,707	10,078
Total ..	56,556	46,097	45,112

The variations under each detailed head of charge are explained below :—

—	1895-96.	1896-97.	Difference. More.	Difference. Less.
	Rs.	Rs.	Rs.	Rs.
Salaries of Superintendents and light-keepers	21,606	21,530	..	76
Oil	6,738	5,991	..	747
Stores	3,694	4,904	1,210	..
Contingencies	2,352	2,608	256	..
Public Works charges	11,707	10,079	..	1,628
Total ..	46,097	45,112	1,466	2,451
			— 985	

The increase under stores is due to cost of light at Hangarkotta.

APPENDIX A.

Particulars of charges relating to different Lights.

—	Establishment. Superintendents.	Establishment. Lightkeepers.	Oil.	Stores.	Contingencies and Miscellaneous.	Construction and repairs.	Total, 1896-97.	Total, 1895-96.	Total, 1894-95.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	
Hangarkota	..	67 3 3	..	1,053 0 6	79 14 9	100 0 0	(a)1,300 2 6	..	..	
Coondapoor	..	191 11 8	41 6 10	11 0 10	11 10 0	6 0 0	261 13 4	311 4 3	414 8 11	
Malpe	..	191 11 9	61 12 3	24 7 6	0 4 0	1 8 0	279 11 6	287 10 2	271 8 11	
Mangalore	..	336 0 0	149 7 11	142 9 10	98 5 9	133 14 11	860 6 5	(b)5,101 14 10	694 5 5	
Cannanore	..	216 0 0	12 0 11	4 9 3	72 0 9	..	304 10 11	337 6 3	408 15 7	
Tellicherry	..	228 0 0	2 7 7	20 14 8	20 14 3	51 3 3	323 7 9	492 7 6	1,044 14 7	
Calicut	..	312 11 4	145 11 11	155 6 7	39 3 8	35 13 6	688 15 0	(c) 1,671 13 5	889 1 4	Light at end of pier.
			Expenditure met from Calicut port contingencies.							
Do.	..	334 3 6	184 11 6	153 14 3	47 2 0	179 15 0	899 14 3	778 12 9	846 6 5	
Cochin	1,200 0 0	646 7 3	812 10 0	753 3 8	300 2 4	425 8 0	(d)4,137 15 3	3,491 4 6	2,849 8 8	
Muttum	677 6 6	323 12 7	77 4 5	153 14 6	78 3 9	443 15 8	(e)1,754 9 5	1,290 8 1	2,927 9 3	
Manapad	..	669 13 2	175 15 9	162 6 1	383 1 10	524 9 6	(f)1,915 14 4	1,683 9 7	1,418 8 9	
Tuticorin	..	353 0 4	175 15 10	147 13 10	37 14 6	306 11 7	(g)1,021 8 1	880 10 2	521 3 9	
Pámban	..	240 0 0	47 3 1	24 7 6	17 3 0	..	328 13 7	452 6 1	426 14 3	
Tondi	..	213 3 7	27 12 4	3 1 4	65 11 6	395 1 1	(h) 704 13 10	353 13 11	545 11 7	
Point Calimere	..	355 13 11	140 1 7	212 0 5	60 13 3	..	768 13 0	861 4 1	738 2 11	
Negapatam	..	456 0 0	66 0 5	2 15 9	45 12 0	..	570 12 2	564 9 4	1,191 5 11	
Cuddalore	..	511 4 3	243 14 2	134 15 5	67 14 2	122 9 6	1,920 9 6	2,098 8 9	1,992 10 1	
Seven Pagodas	840 0 0	658 4 2	1,347 5 2	267 13 5	247 7 4	290 1 6	(i)4,310 15 7	3,523 14 2	5,133 4 5	
Madras	1,500 0 0									Two lights mark the entrance to the harbour and two lights show the fair way.
			Expenditure met from Madras port contingencies.							
Do.	}									
Do.	}		203 11 3	138 3 7	75 8 7	..	1,663 11 4	1,826 7 5	3,431 1 11	
Pulicat	840 0 0	406 3 11	254 7 11	230 1 11	93 6 3	92 15 0	2,512 2 1	2,413 5 4	5,625 15 4	
Armeghon	1,200 0 0	641 3 0	156 3 6	140 5 5	161 4 7	617 15 0	(j)2,463 6 3	1,856 12 0	2,674 14 1	
Point Divi	775 12 10	611 12 11	48 9 10	30 2 0	45 5 3	..	352 1 1	428 11 3	465 10 4	Bar lights.
Masulipatam	..	228 0 0								
			Expenditure met from Landing and Shipping Dues Act, III of 1885.							
Do.	840 0 0	801 12 10	236 9 6	143 6 11	161 1 0	116 9 6	2,299 7 9	2,295 15 0	2,702 10 1	
Hope Island	..	372 0 0	4 14 7	98 6 5	58 11 11	..	534 0 11	(k)1,659 13 6	..	Groynes lights.
Sacramento	}									
Cocanada	}									
			Expenditure met from Landing and Shipping Dues Act, III of 1885.							
Do.	840 0 0	504 0 5	136 1 4	94 2 10	138 3 0	361 4 0	2,073 11 7	2,072 15 3	2,364 6 9	
Vakalapudi	840 0 0	527 13 0	840 9 2	371 7 4	86 9 0	1,903 6 10	(l)4,569 13 4	3,012 9 10	2,747 9 6	
Santopilly	840 0 0	531 3 4	398 1 11	219 8 7	93 14 0	3,912 4 4	5,995 0 2	5,889 11 3	13,726 12 5	
Calingapatam	..	207 15 0	..	9 0 4	20 11 9	57 2 0	294 13 1	(m) 458 11 7	502 3 5	Light at end of pier.
Gopalpur										
			Expenditure met from Gopalpur port contingencies.							
Do.										
Total ..	10,393 3 4	11,137 5 2	5,991 2 8	4,903 8 6	2,608 6 2	10,078 8 2	45,112 2 0	46,096 14 3	56,556 0 7	

(a) Expenditure for 1896–97 includes cost of light, Rs. 1,053–0–6.
(b) A sum of Rs. 4,255 was charged in 1895–96, on account of improvements in lightning conductor.
(c) Expenditure for 1895–96 included a sum of Rs. 885 for construction of light-keepers' quarters and repairs to lighthouse.
(d) A sum of Rs. 425–8–0 was charged for repairs of lighthouse building and Rs. 547, cost of stores including oil-tanks supplied by Government Dockyard.
(e) Includes a charge of Rs. 418 on account of repairs to lighthouse.
(f) Excess in expenditure is due to cost of construction of oil godown, Rs. 322.
(g) Includes a charge of Rs. 164 for repairing lighthouse.
(h) A charge of Rs. 395 for construction of light-keepers' quarters accounts for increase in expenditure.
(i) Excess in cost of oil due to lamp being maintained at full power.
(j) Excess in charges due to preliminary charges for the construction of new lighthouse and for clearing well.
(k) A sum of Rs. 1,078 was charged in 1895–96 for construction of lighthouse shed.
(l) Includes Rs. 1,903 charged for constructing light-keepers' quarters.
(m) No charge appears in 1896–97 on account of cost of oil. The charge for 1895–96 represents cost of supply of oil for two years.

APPENDIX

List of lights on the

Name of light.	Location.	Latitude, N.	Longitude, E.	Number and relative position of lights.	Colour of lights.	Fixed, flashing, intermitting, alternating or revolving.	Interval of revolution or flash or occultation.	Miles visible in clear weather.
Coondapoor ..	On a site 50 feet to the northward of the southern boundary pillar of the port.	13° 37′ 30″	74° 39′ 40″	1	White ..	F.	....	6
Hangarkotta ..	On the masonry column marking the northern limit of the port. The pillar is on the beach or on south side of mouth of the river.	13 27 30 approximately.	74 41 0 approximately.	1	Red ..	F.	....	8
Malpe ..	In the vicinity of the Custom House.	13 20 40	74 42 0	1	White ..	F.	....	6 to 8
Mangalore ..	On a hill above the town, and near some high trees.	12 52 17	74 50 08	1	Do. ..	F.	....	14
Cannanore ..	On the Fort rampart near the beach.	11 51 10	75 21 45	1	Red ..	F.	....	6 to 8
Tellicherry ..	On the Fort wall near the beach.	11 44 50	75 28 30	1	White ..	F.	....	6 to 8
Mahé (French Territory).	On the south side of the entrance to the river, at the foot of the flagstaff.	11 42 10	75 31 10	1	Red ..	F.	....	7
Calicut ..	Near the beach ..	11 15 05	75 45 35	1	White ..	F.	....	14
Narakel (Cochin Territory).	On the beach at mouth of creek, 5 miles to the northward of Cochin.	10 03 0	76 12 0	1	Do. ..	F.	....	10
Cochin ..	On a small mound which formed a bastion of the old fort to the south of the harbour.	9 57 47	76 13 45	1	Do. ..	F.	....	14
Alleppy or Alipee (Travancore Territory).	On the beach, about one cable inland.	9 30 0	76 19 0	1	Do. ..	Rev.	One minute ..	17
Muttum ..	On a rocky promontory 300 yards from sea, known as Muttum Point.	8 07 30	77 18 10	1	Do. ..	F.	....	17

[The candle power of each light is given in units of 1,000 candles to a minimum of $\frac{1}{10}$ or 100 candles; all lights of less power are also shown as $\frac{1}{10}$ except leading lights and occasional lights to which no candle power is assigned.]

B.

Coasts of the Madras Presidency.

Arc of illumination. (Bearings are magnetic and from seaward.)	Nature of construction, colour or any peculiarity of light-house.	Height, in feet, of centre of lantern above high water.	Height, in feet, of building from base to vane.	Character and order of illuminating apparatus.	Year lighted.	Candle power in units of 1,000 candles.	Remarks.
180°	Steel mast ..	45	40	6th order dioptric port light.	1st October 1888; present light, 1st Nov. 1891; altered, 15th Sept. 1894.	$\frac{1}{10}$	Exhibited only from 15th September to 31st May.
From N. thro' E. to S., obscured between S. and S. 9° E. by trees and between N. and N. 5° E. and N. 9° E. and N. 14° 30′ E. by St. Mary's Isles.	White masonry column.	12	15	4th order dioptric port light.	9th Nov. 1896.	$\frac{1}{10}$	Being required for coasting vessels during the fair season, will be extinguished yearly between 1st June and 14th September, both days inclusive.
From N. thro' E. to S., shut in between N. and N.E. by trees, N. 53 E. and N. 57 E. by St. Mary's Islands, N. 73 E. to N. 80 E. by St. Mary's Islands.	Steel mast ..	53	50	6th order dioptric port light.	1st October 1888; present light, 1st Nov. 1891.	$\frac{1}{10}$	Exhibited only from 15th September to 31st May.
From N. by E. $\frac{1}{2}$ E. thro' E. to S. by W. $\frac{1}{2}$ W.	Small white masonry tower.	240	65	Dioptric 4th order.	1st October 1842; improved, 1870.	$1\frac{1}{4}$	
Between the bearings of N. W. by W. $\frac{1}{4}$ W. and E. by S. S.	Small masonry tower of a light yellow colour.	64	25 from the rampart.	Dioptric, 6th order, port light.	17th Oct. 1843; improved, 1870; transferred to tower, 1880.	$\frac{1}{10}$	
N.W. thro' E. to S.E.	Small masonry tower.	70	26	Do.	1835; improved, 1870; transferred to tower, 1881.	$\frac{1}{10}$	
All round the compass.	Small white pyramid.	52	7	..	1885 ..	..	Shown only during N.E. monsoon.
From N. 25 W. thro' E. to S. 14 E.	White column ..	102	98	Dioptric, 4th order.	1847; improved, 1881.	$1\frac{1}{4}$	To guide vessels to the anchorage clear of the reef, which lies about 1 mile S. 30° W. from the light. A small red light is exhibited from the head of the pier as a guide for small coasting craft when entering the road stead.
180° from N.N.W. thro' E. to S.S.E.	Flagstaff ..	95	102	Country-made lantern.	1865 ..	..	Is exhibited from 15th May to 30th September.
From N. by W. $\frac{3}{4}$ W. thro' E. to S. by E.	White laterite column.	100	91	Dioptric, 4th order.	1st April 1839; improved, 1868.	$1\frac{1}{4}$	
All round the compass.	Masonry round white tower.	113	115	Catadioptric, 1st order (Holophotal).	1862 ..	..	
From N. 64 W. thro' N. and E. to S. 84 E.	Dark grey granite column, showing black and white horizontal stripes from seaward.	142	72	Dioptric, 1st order.	1875; altered 1st January 1893.	6	Is intended to mark the vicinity of the Crocodile Rock, which lies 3 miles S.W. $\frac{3}{4}$ S. of Cadiapatam Point.

List of Lights on the

Name of light.	Location.	Latitude, N.	Longitude, E.	Number and relative position of lights.	Colour of lights.	Fixed, flashing, intermitting, alternating, or revolving.	Interval of revolution or flash or occultation.	Miles visible in clear weather.
Gulf of Manaar. Manapad ..	On summit of Manapad Point.	8° 22′ 30″	78° 6′ 30″	1	Red ..	F.	....	8
Tuticorin ..	On the north extreme of Hare Island or Paundian-tivo, 2½ miles east of Tuticorin town.	8 47 10	78 11 20	1	White ..	F.	....	14
Pámban or Pámban Pass.	On a sand-hill about one mile east of Northern channel.	9 17 14	79 12 38	1	Do. ..	F.	....	14
Tondi ..	About 14 yards due south of the Tondi Sea Custom House.	9 44 45	79 00 30	1	Red ..	F.	....	6 to 8
Point Calimere.	On the point about 30 miles south of Negapatam.	10 18 0	79 51 30	1	Do. ..	F.	....	6 to 8
Negapatam ..	On the jetty near to the river mouth.	10 45 30	79 50 20	1	White ..	F.	....	14
Karikal (French Territory).	At the mouth of the Araselar river.	10 55 0	79 50 35	1	Do. ..	F.	....	9
Cuddalore ..	On cross trees of flagstaff.	11 43 0	79 46 15	1	Red ..	F.	....	6 to 8
Pondicherry (French Territory).	In square, near the beach.	11 55 25	79 49 35	1	White ..	F.	....	14
Do. ..	End of landing stage.	..	..	1	Red ..	F.	....	4
Seven Pagodas or Mahábalipuram.	On a rock half a mile inland marked on chart "Ruined Pagoda" on rock very conspicuous and about 6 miles northward of Sadras.	12 36 55	80 11 31	1	Do. ..	F.	....	10
Madras or Fort St. George.	On the main tower of the Law Courts on the Esplanade, north of the Fort.	13 05 13	80 16 52	1	White ..	Fl.	Double flashing of half-minute periods giving two flashes of about 2 seconds separated by an eclipse of about 3 seconds followed by a long eclipse of 23 seconds.	20
Madras Harbour Lights.	On the towers marking the entrance to the harbour.	Madras Harbour.	Madras Harbour.	2	Red ..	F.	....	6
Madras Leading Light.	Madras Pier T Head.	13 05 44	80 17 18	1	Do. ..	F.	....	5
Do. ..	Custom office Terrace.	13 05 47	80 17 05	1	Green ..	F.	....	5

[The candle power of each light is given in units of 1,000 candles to a minimum of $\frac{1}{10}$ or 100 candles; all lights

Coasts of the Madras Presidency—*cont.*

Arc of illumination. (Bearings are magnetic and from seaward.)	Nature of construction, colour or any peculiarity of lighthouse.	Height, in feet, of centre of lantern above high water.	Height, in feet, of building from base to vane.	Character and order of illuminating apparatus.	Year lighted.	Candle power in units of 1,000 candles.	Remarks.
N.N.E. thro' E. to S.S.W.	White masonry tower.	104	27	Dioptric, 4th order, port light.	June 1888..	$\frac{1}{10}$	Is intended to warn vessels of the dangerous shoal in the vicinity.
All round the compass.	Standstone column, coloured brown, lantern white.	85	91	Dioptric, 4th order.	15th May 1845; improved, 1874; improved, 1893.	1	
Do.	Circular masonry column.	97	72	Do.	21st April 1846; improved, 1860; improved, 1893.	1	As a guide to vessels making for the Pámban channel.
Visible from all directions seaward.	Steel mast ..	63	52	Dioptric, 6th order, port light.	1st October 1892.	$\frac{1}{10}$	
All round the compass.	Steel mast, painted white.	49	..	Do.	1st June 1890.	$\frac{1}{10}$	As a guide to vessels passing between Point Calimere and the shoals to the eastward.
From N. 5 W. thro' W. to S.S.E.	Masonry column, painted white.	79	83	Dioptric, 4th order.	1st August 1846; improved, 1870; improved, 1893.	1¼	
Visible from all directions seaward.	Do.	42	..	Lamp burning cocoanut oil.	1853.	..	
N. thro' W. to S.	Flagstaff ..	130	31	Dioptric, 6th order, port light.	1st July 1889; present light, 5th Oct. 1891.	$\frac{1}{10}$	
Visible from all directions seaward.	Masonry column, painted light yellow.	89	76	Dioptric, 4th order.	1886 ..	..	When surf is heavy, and approach to landing prohibited, a *fixed green* light is shown.
Do.	....	31	..	....	1881 ..	..	
From N. thro' W. to south (180°).	Small grey turret.	119	26	Dioptric, 4th order.	10th July 1887; improved, 1893.	½	Is intended to warn mariners of the dangerous outlying patches of rock composing the *Tripalore* reef and other reported dangers in its vicinity, to avoid which vessels navigating between Sadras and Covelong should not come into a less depth than 13 fathoms.
Shows all round the compass visible from all directions seaward on the following bearings from N. by E. thro' W. to S. by W.	Tower is an octagonal structure of brick and stone.	166	190	Dioptric, 3rd order.	1st June 1894.	5½ to 18	Service intensity full power 18,000 candles.
All round the compass.	Masonry towers.	37	25	Port lights, dioptric, 6th order.	1st January 1896.	$\frac{1}{10}$	To guide vessels entering or leaving the harbour at night.
From S. 51° 45′ W. thro' W. to N. 17° W.	Wooden post ..	30	..	Ship's side light, dioptric.	15th Oct. 1888.	..	To guide vessels leaving the harbour or making the anchorage at night.
Do.	Do. ..	60	..	Do.	Do.	..	Do.

of less power are also shown as $\frac{1}{10}$ except leading lights and occasional lights to which no candle power is assigned.]

List of Lights on the

Name of light.	Location.	Latitude, N.	Longitude, E.	Number and relative position of lights.	Colour of lights.	Fixed, flashing, intermitting, alternating, or revolving.	Interval of revolution or flash or occultation.	Miles visible in clear weather.
Pulicat ..	Near the beach ..	13° 25′ 15″	80° 19′ 06″	1	White ..	F.	....	14
Armeghon or Armogham.	On the mainland, village of Moona or Moonapollium.	13 53 08	80 11 47	1	Do. ..	Rev.	Every 45 seconds ..	14
Point Divi or Divy.	About 2 miles north-west of the point.	15 58 55	81 09 25	1	Do. ..	F.	....	12
Masulipatam ..	In the Fort ..	16 09 15	81 09 25	1	Do. ..	F.	....	6
Coringa or Hope Island.	On the southern part of Hope island, Coringa harbour, and distant about 2½ miles from the sea.	16 49 05	82 18 58	1	Do. ..	F.	....	14
Cocanada or Vakalapudi.	4¾ miles north of Cocanada river and about 500 yards from the shore.	17 0 40	82 16 30	1	Do. ..	Rev.	Every 20 seconds ..	14
Cocanada river..	One on the end of the North Groyne, and the other on the end of the South Groyne, entrance to river.	....	....	2	Red ..	F.	....	2½
Sacramento shoal light (temporary).	On the sand half-a mile from the beach near the Kottapoliem beacon.	16 34 40	82 16 30	1	Do. ..	F.	....	10
Santopilly ..	On a small detached hill some distance inland. This distance said to be ¾ of a mile.	18 04 56	83 37 35	1	White ..	F.	....	16
Calingapatam ..	On the point ..	18 19 0	84 07 30	1	Do. ..	Occulting every half-a minute.	27½ seconds light and 2½ seconds eclipse.	14
Baruva ..	On the Port flagstaff.	18 42 30	84 34 0	2	Do. ..	F.	....	About 3
Gopalpur ..	On the mainland 60 yards from low water mark.	19 13 0	84 52 0	1	Do. ..	F.	....	10
Do. ..	On the extreme end of the pier head, port of Gopalpur.	....	....	1	Red ..	F.	....	3

[The candle power of each light is given in units of 1,000 candles to a minimum of $\frac{1}{10}$ or 100 candles; all lights

Coasts of the Madras Presidency—*cont.*

Arc of illumination. (Bearings are magnetic and from seaward).	Nature of construction, colour or any peculiarity of light-house.	Height, in feet, of centre of lantern above high water.	Height, in feet, of building from base to vane.	Character and order of illuminating apparatus.	Year lighted.	Candle power in units of 1,000 candles.	Remarks.
From N. by W. thro' W. to S. by E.	Masonry column with black bands.	68	57	Dioptric, 4th order.	1859; improved, 1870; altered 1881; improved 1893.	1¼	To guide vessels clear of the *Pulicat shoal*.
From N.E. thro' W. to S.E.	White masonry column.	107	111	Dioptric, 4th order, single flash. 45 seconds.	1st January 1853; improved, 1870; present light, 1881; improved, 1893.	3¼	Warns vessels off the *Armeghon shoal*, the shoalest part of which (1¾ fathoms) lies 6 miles off shore.
From N.E. thro' W. to S.	Do.	48	50	Dioptric, 4th order.	1st May 1851; improved, 1870; improved, 1893.	1	Is intended to guide vessels clear of the point.
From S. 26° W. thro' W. to N. 9° E.	Flagstaff ..	69	112	Dioptric, 6th order.	1858; improved, 1870.	⅛	As a guide for vessels to the anchorage.
From N. 5° E. thro' W. to S. 5° W.	Masonry tower, horizontal alternate bands of black and white.	83	94	Dioptric, 4th order.	1817; improved, 1886; improved, 1893.	½	Is intended to guide vessels clear of Sacramento shoal and Gódávari Point.
All round the compass.	White column..	80	76	Dioptric, 4th order, single flash, 20 seconds.	15th January 1879.	3¼	This light is intended as a guide to vessels approaching Cocanada anchorage.
Do.	Wooden post ..	10	..	....	15th September 1886.	..	To guide boats entering or leaving Cocanada river.
From N. 45 E. thro' W. to S. 45 W.	Temporary wooden structure with thatched roof.	25½	16½	Dioptric, 4th order, port light.	1st October 1895.	$\frac{1}{10}$	
From N E. thro' W. to S.W.	On a small basement on the top of a small hill with a small building by the side of the lantern on the west side.	163·77	31·15	Dioptric, 2nd order; improved, 1893.	1st November 1849; improved, 1871; present light, 1886; improved, 16th Aug. 1888.	4½	Exhibited to warn mariners of the *Santopilly Rocks*, from which this light bears N.W. ⅝ W., distant 6½ miles.
Visible from all directions seaward.	Obelisk of cut stone; column white; outside ladder red.	76	73	Dioptric, 4th order.	15th December 1876; improved, 1st June 1890; altered, 1st Sept. 1895.	½	Intended to warn vessels of a small reef which projects from the point and which should not be passed in less than 8 fathoms when making the port at night.
All round the compass.	Flagstaff ..	46	Shown from yard-arm of flag-staff.	Globular lanterns.	12th October 1895.	..	These lights are occasionally exhibited to indicate the position of the port flagstaff for the purpose of taking up an anchorage and are not to be relied on for purposes of navigation.
From N.E. thro' N.W. to S.W.	Flagstaff, painted white.	54	33	Dioptric, 4th order, port light.	Present light, 1871; 1st March 1892.	⅛	As a guide to the anchorage.
All round the compass.	....	25	..	Country lantern.	1st April 1887.	..	Points out the sea end of the pier.

of less power are also shown as $\frac{1}{10}$ except leading lights and occasional lights to which no candle power is assigned.]

APPENDIX C.

Statement furnishing { (1) Particulars of Inspections made of Lighthouses on the Madras Coasts in 1896–97. (2) Remarks in connection with lightning conductors.

Name of lights.	Officers by whom inspected.	Number of inspections.	Remarks as to lightning conductors.
Coondapoor	Presidency Port Officer	1	
	Port Officer, Mangalore	3	
	Executive Engineer, Lighthouse division ..	1	
Hangarkotta ..	Port Officer, Mangalore	2	
Malpe	Port Officer, Mangalore	2	
	Presidency Port Officer	1	
Mangalore	Presidency Port Officer	1	Lightning conductor not tested during the year.
	Executive Engineer	1	
	Presidency Port Officer	1	
Cannanore	Port Officer, Tellicherry	12	Not tested during the year.
	Executive Engineer and Assistant Engineer jointly.	1	
	Presidency Port Officer	1	
Tellicherry	Sub-divisional Officer, Public Works Department.	4	Tested during the year.
	Presidency Port Officer	1	
Calicut	Executive Engineer, Lighthouse division ..	1	Do. do.
	Do. West Coast division ..	1	
	Superintending Engineer	1	
	Presidency Port Officer	1	
Cochin	Executive Engineer, Lighthouse division ..	1	Do. do.
	Port Officer, Tuticorin	2	
Muttum	Sub-divisional Officer, Public Works Department.	1	Do. do.
	Port Officer, Tuticorin	2	
Manapad	Sub-divisional Officer, Public Works Department.	2	Do. do.
	Sub-Engineer, Lighthouse division	1	
Tuticorin	Presidency Port Officer	1	Do. do.
	Executive Engineer, Lighthouse division ..	1	
	Presidency Port Officer	3	
Pámban	Executive Engineer, Madura division ..	1	Not tested during the year.
	Do. Lighthouse division ..	1	
Tondi	Port Officer, Pámban	4	
Point Calimere ..	Port Officer, Negapatam	12	
	Divisional Officer, Public Works Department ..	1	
Negapatam	Presidency Port Officer	1	Tested during the year.
	Executive Engineer	1	
Cuddalore	Personal Assistant to Presidency Port Officer ..	1	
Seven Pagodas ..	Presidency Port Officer	1	
	Executive Engineer	1	Do. do.
	Do. Lighthouse division ..	1	
	Executive Engineer, Lighthouse division ..	1	
Pulicat	Presidency Port Officer	1	Not tested during the year.
	Superintending Engineer	1	
	Executive Engineer	1	
	Presidency Port Officer	1	
Armeghon	Sub-divisional Officer	1	Do. do.
	Do. Lighthouse division ..	1	
	Executive Engineer	1	
Point Divi	Port Officer, Masulipatam	12	Do. do.
Hope Island	Port Officer, Cocanada	6	Do. do.
	Presidency Port Officer	1	
Vakalapudi	Port Officer, Cocanada	8	Do. do.
	Assistant Engineer	1	
	Port Officer, Cocanada	4	
Sacramento Shoal ..	Presidency Port Officer	2	
	Executive Engineer, Lighthouse division ..	1	
	Port Officer, Bimlipatam	6	
Santopilly	Presidency Port Officer	1	Do. do.
	Presidency Port Officer	1	
Calingapatam ..	Executive Engineer, Lighthouse division ..	1	Do. do.
	Port Officer, Gopalpur	2	
Gopalpur	Executive Engineer, Lighthouse division ..	1	Do. do.
	Presidency Port Officer	..	

N.B.—Lights in the immediate charge of local Port Officers were frequently inspected by such Officers.

APPENDIX D.

Statement showing the Sanctioned Establishments of Lighthouses on the Madras Coasts as they stood on the 31st March 1896.

Lights.	Superintendents.			Head Lightkeepers.			Lightkeepers.		
	First class.	Second class.	Third class.	First class.	Second class.	Third class.	First class.	Second class.	Third class.
	Rs. 100.	Rs. 70.	Rs. 50.	Rs. 15.	Rs. 12.	Rs. 10	Rs. 9.	Rs. 8.	Rs. 7.
Coondapoor	..	..	..	..	..	(a) 1	..	..	(b) 1
Hangarkotta	..	..	..	..	..	(a) 1	..	..	(b) 1
Malpe	..	..	..	..	..	(a) 1	..	..	(b) 1
Mangalore	..	..	..	..	..	(c) 1	..	1	1
Cannanore	..	..	..	..	..	(a) 1	..	..	1
Tellicherry	..	..	..	..	..	(a) 1	..	1	..
Calicut	..	..	..	..	..	(c) 1	..	1	1
Cochin	..	..	..	..	..	(c) 1	..	1	1
Muttum	..	..	..	1	..	..	1	1	2
Manapad	..	..	1	..	..	1	..	1	1
Tuticorin (Hare Island)	See below.								
Pámban	..	..	..	..	..	(c) 1	..	1	1
Tondi	..	..	..	..	..	(a) 1	..	1	..
Point Calimere	..	..	..	..	..	(c) 1	..	1	1
Negapatam	..	..	..	..	..	(c) 1	..	1	1
Cuddalore	See below.								
Seven Pagodas	..	1	..	..	1	..	1	1	1
Pulicat	..	..	..	1	..	..	3	1	1
Madras	(d) 1	..	..	..	1	..	1	1	1
Armeghon	..	1	..	..	..	..	1	1	2
Point Divi	..	..	..	1	..	..	1	1	2
Masulipatam	..	..	1	..	1	..	..	1	..
Coringa or Hope Island	..	..	..	..	..	1	..	1	1
Sacremento shoal	..	1	..	..	..	..	1	1	(h) 1
Vakalapudi	..	..	..	(g) 1	..	..	1	1	1
Santopilly	..	..	..	1	..	..	1	..	(j) 1
Calingapatam (k)	..	..	..	..	(i) 1	1	..	1	..
Gopalpore	..	..	..	..	..	..	1	..	..

(a) *Plus* charge allowance of Re. 1.
(b) Temporary for 8 months (October to May).
(c) *Plus* charge allowance of Rs. 2.
(d) *Plus* house allowance of Rs. 25.
(e) Temporarily. *Plus* charge allowance of Rs. 2 and provision allowance of Re. 1.
(f) Temporarily. *Plus* provision allowance of Re. 1.
(g) *Plus* flag signalling allowance of Rs. 10.
(h) Also a flag signaller on Rs. 8 with a provision allowance of Re. 1.
(i) *Plus* charge allowance of Rs. 20.
(j) Rising to Rs. 9.
(k) The whole of Calingapatam establishment is sub. *pro tem.*
(l) Also two water-boys on Rs. 7 each with provision allowance of Re. 1 each.

Note.—The lightkeepers on entertainment will receive Rs. 7 per mensem during their first year of service, after which, if well reported on, they will receive Rs. 8 during their second year and Rs. 9 thereafter. All lightkeepers at Muttum, Manapad, Seven Pagodas, Armeghon, Point Divi, Hope Island, Vakalapudi and Santopilly receive an allowance of Re. 1 per mensem as compensation for the difficulty and expenses connected with obtaining supplies.

Amalgamated Establishment.

Lighthouses.	Head Lightkeepers and Head Signallers.	Lightkeepers and Signallers.				Total staff.
	Rs. 20.	Rs. 11.	Rs. 10.	Rs. 9.	Rs. 8.	
Tuticorin	1	1	1	1	1	53
Cuddalore	1	..	..	2	..	

Temporary—Lighthouse mechanic, Rs. 80 per mensem, rising by annual increments of Rs. 5 to Rs. 100.

APPENDIX E.

STATEMENT showing the consumption of oil and cost of Light-house stores for the official years 1895–96 and 1896–97.

Name of Light.	Consumption of oil.		Cost of stores.		Remarks.
	1895–96.	1896–97.	1895–96.	1896–97.	
	GALLONS.	GALLONS.	RS. A. P.	RS. A. P.	
Hangarkotta	..	29	....	1,053 0 6	Light exhibited in November 1896.
Coondapoor	59	57	34 8 0	11 0 10	
Malpe	61	52	34 10 5	24 7 6	
Mangalore	215	202	81 1 2	142 9 10	
Cannanore	66	49	5 8 5	4 9 3	
Tellicherry	65	49	67 13 3	20 14 8	
Calicut	214	214	157 4 2	155 6 7	
Cochin	208	228	99 13 9	153 14 3	
Muttum	867	856	427 3 1	753 3 8	
Manapad	88	83	31 3 9	53 14 6	
Tuticorin	215	219	161 12 5	162 6 1	
Pámban	207	210	128 6 4	147 13 10	
Tondi	74	76	20 15 10	24 7 6	
Point Calimere	52	50	5 8 4	3 1 4	
Negapatam	205	195	142 6 9	212 0 3	
Cuddalore	60	61	5 13 0	2 15 9	
Seven Pagodas	226	227	(a) 512 1 0	134 15 5	
Madras	800	975	227 12 2	267 13 5	In 1896–97 light was maintained at full power throughout the year.
Pulicat	207	203	265 5 1	138 3 7	
Armeghon	213	213	237 4 10	230 1 11	
Point Divi	206	223	85 9 0	140 5 5	
Masulipatam	57	58	66 9 10	30 2 0	
Hope Island	323	299	163 14 3	143 6 11	
Sacramento	48	90	87 5 8	98 6 5	Light exhibited from 1st October 1895.
Vakalapudi	221	220	126 11 5	94 2 10	
Santopilly	790	821	414 12 7	371 7 4	
Calingapatam	207	366	49 4 5	219 8 7	Improved and exhibited on 1st September 1895.
Gopalpur	66	66	53 1 8	9 0 4	
Total ..	6,020	6,391	3,693 12 7	4,903 8 6	

(a) Includes cost of 100 ruby chimneys.

Any large excess in cost of stores is due to supplies of additional oil tanks and stands; decrease, in the same way, to supplies of tanks and glass cylinders in previous year.

The aggregate consumption is slightly in excess of the previous year, owing to establishment of a new light at Hangarkotta; maintaining the Madras light at full power throughout the year; and to small increases in consumption at some stations. The increases in consumption are all at lights fitted with the Douglass burners, and indicate better attention on the part of keepers in maintaining the flame. At the minor lights which require no regular watch, the decrease is due to closer supervision over expenditure. The value of oil delivered at the various stations is taken at an average of Re. 1 per gallon, exchange being 1*s.* 4*d.*; the cost last year being Rs. 6,020, this year Rs. 6,391. The actual debits in the accounts being respectively Rs. 6,738 and Rs. 5,991, the small discrepancies are due to difference in exchange and rates of freight.

APPENDIX F.

STATEMENT showing the Description of Lights and the Consumption of Oil.

Serial number.	Order of light.	Candle power.	Consumption of oil in 1896–97.	Remarks.
	6th Order Dioptric Port Light.			
1	Cannanore	100	49	
2	Point Calimere	100	50	
3	Cuddalore	100	61	
4	Tondi	100	76	
5	Tellicherry	125	49	
6	Malpe	125	52	
7	Coondapoor	125	57	
8	Masulipatam	125	58	
	4th Order Dioptric Port Light.			
9	Hangarkotta	100	29	
10	Manapad	100	83	
11	Sacramento shoal	100	90	
12	Gopalpore	125	66	
	4th Order Dioptric.			
13	Seven Pagodas	500	227	
14	Hope Island	500	299	
15	Calingapatam	500	366	
16	Pámban	1,000	210	
17	Tuticorin	1,000	219	
18	Point Divi	1,250	195	
19	Negapatam	1,250	202	
20	Mangalore	1,250	203	
21	Pulicat	1,250	203	
22	Calicut	1,250	214	
23	Cochin	1,250	228	
24	Armeghon	3,250	213	
25	Vakalapudi	3,250	220	
	3rd Order Dioptric.			
26	Madras	5,500 to 18,000	975	This light being better ventilated than those at Santopilly or Muttum, burns more oil.
	2nd Order Dioptric.			
27	Santopilly	4,500	821	
	1st Order Dioptric.			
28	Muttum	6,000	856	

Order—No. 1051, Marine, dated 23rd December 1897.

With his letter, No. 1815/368 G., dated 20th October 1897, read above, the Presidency Port Officer submits his report on the working of the lights and light-houses on the coasts of the Madras Presidency for the year 1896–97, accompanied by tabular statements showing the cost of maintenance and the character of the various lights, and particulars of inspections. The report shows that the coast was lighted at a cost of Rs. 45,112, or Rs. 985 less than in the preceding year.

2. As directed in G.O., No. 766, Marine, dated 7th November 1896, a statement is submitted in appendix E of the quantities of oil and stores used at each light-house during the year. There is not sufficient information to form an opinion as to the economy of the expenditure on stores, but the quantity of oil consumed shows great inequalities. Thus the consumption varies from 49 to 76 gallons in dioptric port lights of the 6th order, and from 66 to 90 gallons in dioptric port lights of the 4th order; while at the larger ports, the consumption for 4th order dioptric lights ranges from 195 to 366 gallons, as will be seen on reference to the statement F attached to these proceedings. As regards lights of the 1st, 2nd and 3rd order, and in other cases also, the consumption of oil bears no relation to the candle power.

3. The Presidency Port Officer, who was called on to explain these inequalities, reports generally that the consumption of oil is dependent on the class and size of burners used, of which there are eight different kinds in the Madras coast and that variations in the similar burners are due to local causes, such as state of ventilation, and supervision by the keepers. It would also appear that, owing to the disturbing causes mentioned under clause (*d*) of the Presidency Port Officer's letter, No. 1854/414 G., dated 24th November 1897, no true ratio can be established between consumption of oil and candle power of lamps. However this may be, the facts observed point to the advisability of the universal adoption of those descriptions of burners which are found in practice to be the most economical in respect of the consumption of oil. The question should be reported on by Mr. Ashpitel. When inequalities in consumption are great, an attempt should be made by detailed explanation to satisfy Government that there has been no undue waste. The Presidency Port Officer's statement that the consumption of each light is very carefully scrutinized monthly is noted, but it is desirable that in an annual review, all large variations should be scrutinized in detail and the causes of difference clearly exhibited for the information of Government. It is desired that this matter be attended to in future.

The figures in Appendix E against Hangarkota and Manapad under cost of stores have been altered to correspond with those shown in Appendix A.

[Here enter No 1052, Marine, dated 23rd December 1897.]

(True Extract.)

(Signed) W. B. deWINTON,
Ag. Secretary to Government.

To the Presidency Port Officer.
„ the Superintendent of Works, Light-house Division.

Endorsement—No. 1052 Marine, dated 23rd December 1897.

Five copies forwarded to the Government of India, Department of Finance and Commerce.

(By order.)

(Signed) W. B. deWINTON,
Ag. Secretary to Government.

Exd. T. K. Narayana Aiyangar.

[4 / 500-14-10-97.]

Marine DEPARTMENT.

Working of Lights and light houses-1896-97

Papers to be read in proceedings:—

Again G.O., dated			189 , No.	
Again G.O., dated			189 , No.	
Current No.	of 189 , dated		, from	
„ „ 1361	„ 189 7,	„ 21st Oct. 1897,	„	the P.P.O.
„ „ 1517	„ 189 ,	„ 29th Nov. 1897,	„	- do -

The Hon. Sir Henry Blisk K.C.I.E.

ORDER.

P 1051/Ma 23.12.97

With his letter No. 1815/368 G. dated 20th October 1897 read above, the Presidency Port Officer submits his report on the working of the lights and light houses on the coasts of the Madras Presidency for the year 1896-97, accompanied by tabular statements showing the cost of maintenance and the character of the various lights, and particulars of inspections.

2. There is not sufficient information to form an opinion as to the economy of the expenditure on stores, but ~~a comparative statement of~~ the quantity of oil consumed shows great inequalities. Thus the consumption varies from 49 to 76 gallons in dioptric port lights of the 6th order, and from 66 to 90 gallons in dioptric port lights of the 4th order, while at the larger ports the consumption

The Report shews that the coast was lighted at a cost of Rs 45,112 or Rs 985 less than in the preceding year

2. As directed in G.O No 766 Marine dated 7 Nov 1896, a statement is submitted in Appendix E of the quantities of oil & stores used at each light house during the year

consumption for 4th order dioptric lights ranges from 195 to 366 gallons as will be seen on reference to the statement F. attached to these Proceedings. As regards lights of the 1st, 2nd and 3rd order, and in other cases also, the consumption of oil bears no relation to the candle power.

3. The Presidency Port Officer, who was called on to explain these inequalities, reports generally that the consumption of oil is dependent on the class and size of burners used, and that variations in similar burners are due to local causes, such as state of ventilation, and supervision by the keepers. It would also appear that, owing to the disturbing causes mentioned under clause (d) of the Presidency Port Officer's letter No. 1854/414. G. dated 24th November 1897, no true ratio can be established between consumption of oil and candle power of lamps ~~but His Excellency the Governor in Council observes that~~ When ~~the~~ inequalities in consumption are ~~so~~ great ~~as those disclosed by statement F.~~ some attempt should ~~have been~~ made by detailed explaination to satisfy ~~the~~ Government that there has been no undue waste. The Presidency Port Officer's statement that the consumption of each light is very carefully scrutinised monthly is noted, but it is desirable that in an annual review, all large variations should be scrutinised in detail and the causes of difference clearly exhibited for the information of Government. It is desired that this matter be attended to in future.

The figures in Appendix E --- against Hangarkota and Manapad under cost of stores have been altered to correspond with those shown in Appendix A.

The Presidency Port Officer.
,, Supt. of Works, L.H. Division.

(H.E. No. 1052 Marine, d/ 23-12-97
Five copies forwarded to the Government of India, Department of Finance and Commerce.

Statement showing the description of lights and the consumption of oil.

4.

Serial No.	Order of light	Candle power	Consumption of oil in 1896-97	Remarks.
	6th Order, dioptric port light.			
1	Cannanore	100	49	
2	Point Calimere	100	50	
3	Cuddalore	100	61	
4	Tondi	100	76	
5	Tellicherry	125	49	
6	Malpe	125	52	
7	Coondapoor	125	57	
8	Masulipatam	125	58	
	4th order, dioptric port light			
9	Hangarkotta	100	29	Established only on 1st Nov. 1896
10	Manapad	100	83	
11	Sacramento Shoal	100	90	
12	Gopalpore	125	66	
	4th Order, dioptric			
13	Seven Pagodas	500	227	
14	Hope Island	500	299	
15	Calingapatam	500	366	
16	Pamban	1000	210	X
17	Tuticorin	1000	219	
18	Point Divi	1000	223	
19	Vizagapatam	1250	195	X
20	Mangalore	1250	202	
21	Pulicat	1250	203	
22	Calicut	1250	214	
23	Cochin	1250	228	
24	Armeghon	3250	213	
25	Vakalapudi	3250	220	
	3rd order, dioptric			
26	Madras	5500 to 18000	975	This light being better ventilated than those at Santopilly or Muttum, burns more oil.
	2nd order, dioptric.			
27	Santopilly	4500	821	
	1st Order, dioptric			
28	Muttum	6000	851	

Marine (1897) Department.

CURRENT No. 1361.

From

The Presy: Port officer

Madras

No. 1815/368 Q

Dated 20th
Received 21st
Registered 21st
} October 1897.

Enclosures 1 (3 S.C.)

Spare copies .

SUBJECT.

Annual report on the Lights & Lighthouses on the Coasts of the Madras Presy: for 1896-97.

BACK PAPERS.

G.O.	No.	Department.	Date.
4-0	766-	7 8	7-11-96

FURTHER PAPERS.

G.O.	No.	Department.	Date.

REPORT ON THE LIGHTS AND LIGHTHOUSES ON THE COASTS OF THE MADRAS PRESIDENCY FOR THE OFFICIAL YEAR 1896–97.

GENERAL REMARKS.

The lights on the coast were displayed without interruption during the year, and the buildings appertaining thereto maintained in good order.

2. For the benefit of coasting vessels a fixed red light was brought into use at Hangarkotta, in South Canara. It is placed on a masonry column marking the northern limit of the port, and is displayed only during the busy season, viz., from 15th September to 31st May.

3. Heavy mineral oil was used at all the lights, except the Madras Harbour lights which used kerosine oil.

4. The total cost of maintaining the lighthouses during the year was Rs. 45,112 against Rs. 46,097 in the previous year, showing a decrease in charges of Rs. 985 (*see* statement and remarks under "Lighthouse charges").

INSPECTIONS.

See remarks in Appendix C.

LIGHTNING CONDUCTORS.

See remarks in Appendix C.

ESTABLISHMENTS.

Details of the Lighthouse staff are given in Appendix D and of cost in Appendix A.

PARTICULARS OF LIGHTS.

See Appendix B.

STORES AND SUPPLIES.

These were well maintained. A comparative statement of expenditure of oil and stores during the year 1895–96 and 1896–97 is given in Appendix E.

LIGHTHOUSE CHARGES.

Appendix A affords particulars of charges for the year. The following is a comparative statement thereof for the past three years:—

—	1894–95.	1895–96.	1896–97.
	Rs.	Rs.	Rs.
Establishment, oil, stores and contingencies	43,907	34,390	35,034
Public Works charges	12,649	11,707	10,078
Total ..	56,556	46,097	45,112

The variations under each detailed head of charge are explained below :—

—	1895–96.	1896–97.	Difference.		Remarks.
			More.	Less.	
	Rs.	Rs.	Rs.	Rs.	
Salaries of Superintendents and light-keepers	21,606	21,530	..	76	
Oil	6,738	5,991	..	747	
Stores	3,694	4,804	1,210	..	
Contingencies	2,352	2,608	256	..	
Public Works charges	11,707	10,079	..	1,628	
Total ..	46,097	45,112	1,466	2,451	
			— 985		

The increase under stores is due to cost of light at Hangarkotta.

APPENDIX A.

PARTICULARS of charges relating to different Lights.

1	Establishment. Superintendents. 2	Establishment. Lightkeepers. 3	Oil. 4	Stores. 5	Contingencies and Miscellaneous. 6	Construction and repairs. 7	Total, 1896–97. 8	Total, 1895–96. 9	Total, 1894–95. 10	Remarks. 11
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	
Hangarkota	..	67 3 3	..	1,053 0 6	79 14 9	100 0 0	(a)1,300 2 6	..	..	
Coondapoor	..	191 11 8	41 6 10	11 0 10	11 10 0	6 0 0	261 13 4	311 4 3	414 8 11	
Malpe	..	191 11 9	61 12 3	24 7 6	0 4 0	1 8 0	279 11 6	287 10 2	271 8 11	
Mangalore	..	336 0 0	149 7 11	142 9 10	98 5 9	133 14 11	860 6 5	(b)5,101 14 10	694 5 5	
Cannanore	..	216 0 0	12 0 11	4 9 3	72 0 9	..	304 10 11	337 6 3	408 15 7	
Tellicherry	..	228 0 0	2 7 7	20 14 8	20 14 3	51 3 3	323 7 9	492 7 6	1,044 14 7	
Calicut	..	312 11 4	145 11 11	155 6 7	39 3 8	35 13 6	688 15 0	(c) 1,671 13 5	889 1 4	
Do.	Expenditure met from Calicut port contingencies.									
Cochin	..	334 3 6	184 11 6	153 14 3	47 2 0	179 15 0	899 14 3	778 12 9	846 6 5	Light at end of pier.
Muttum	1,200 0 0	646 7 3	812 10 0	753 3 8	300 2 4	425 8 0	(d)4,137 15 3	3,491 4 6	2,849 8 8	
Manapad	677 6 6	323 12 7	77 4 5	153 14 6	78 3 9	443 15 8	(e)1,754 9 5	1,290 8 1	2,927 9 3	
Tuticorin	..	669 13 2	175 15 9	162 6 1	383 1 10	524 9 6	(f)1,915 14 4	1,683 9 7	1,418 8 9	
Pámban	..	353 0 4	175 15 10	147 13 10	37 14 6	306 11 7	(g)1,021 8 1	880 10 2	521 3 9	
Tondi	..	240 0 0	47 3 1	24 7 6	17 3 0	..	328 13 7	452 6 1	426 14 3	
Point Calimere	..	213 3 7	27 12 4	3 1 4	65 11 6	395 1 1	(h) 704 13 10	353 13 11	545 11 7	
Negapatam	..	355 13 11	140 1 7	212 0 3	60 13 3	..	768 13 0	861 4 1	738 2 11	
Cuddalore	..	456 0 0	66 0 5	2 15 9	45 12 0	..	570 12 2	564 9 4	1,191 5 11	
Seven Pagodas	840 0 0	511 4 3	243 14 2	134 15 5	67 14 2	122 9 6	1,920 9 6	2,098 8 9	1,992 10 1	
Madras	1,500 0 0	658 4 2	1,347 5 2	267 13 5	247 7 4	290 1 6	(i)4,310 15 7	3,523 14 2	5,133 4 5	
Do.	Expenditure met from Madras port contingencies.									
Do.	840 0 0	406 3 11	203 11 3	138 3 7	75 8 7	..	1,663 11 4	1,826 7 5	3,431 1 11	Two lights mark the entrance to the harbour and two lights show the fair way.
Pulicat	1,200 0 0	641 3 0	254 7 11	230 1 11	93 6 3	92 15 0	2,512 2 1	2,413 5 4	5,625 15 4	
Armeghon	775 12 10	611 12 11	156 3 6	140 5 5	161 4 7	617 15 0	(j)2,463 6 3	1,856 12 0	2,674 14 1	
Point Divi	..	228 0 0	48 9 10	30 2 0	45 5 3	..	352 1 1	428 11 3	465 10 4	
Masulipatam	Expenditure met from Landing and Shipping Dues Act, III of 1885.									
Do.	840 0 0	801 12 10	236 9 6	143 6 11	161 1 0	116 9 6	2,299 7 9	2,295 15 0	2,702 10 1	Bar lights.
Hope Island	..	372 0 0	4 14 7	98 6 5	58 11 11	..	534 0 11	(k)1,659 13 6	..	
Sacramento	Expenditure met from Landing and Shipping Dues Act, III of 1885.									
Cocanada	840 0 0	504 0 5	136 1 4	94 2 10	138 3 0	361 4 0	2,073 11 7	2,072 15 3	2,364 6 9	Groynes lights.
Do.	840 0 0	527 13 0	840 9 2	371 7 4	86 9 0	1,903 6 10	(l)4,569 13 4	3,012 9 10	2,747 9 6	
Vakalapudi	840 0 0	531 3 4	398 1 11	219 8 7	93 14 0	3,912 4 4	5,995 0 2	5,889 11 3	13,726 12 5	
Santopilly	..	207 15 0	..	9 0 4	20 11 9	57 2 0	294 13 1	(m) 458 11 7	502 3 5	
Calingapatam	Expenditure met from Gopalpur port contingencies.									
Gopalpur										Light at end of pier.
Do.										
Total ..	10,393 3 4	11,137 5 2	5,991 2 8	4,903 8 6	2,608 6 2	10,078 8 2	45,112 2 0	46,096 14 3	56,556 0 7	

(a) Expenditure for 1896–97 includes cost of light, Rs. 1,053–0–6.
(b) A sum of Rs. 4,255 was charged in 1895–96, on account of improvements in lightning conductor.
(c) Expenditure for 1895–96 included a sum of Rs. 885 for construction of light-keepers' quarters and repairs to lighthouse.
(d) A sum of Rs. 425–8–0 was charged for repairs of lighthouse building and Rs. 547, cost of stores including oil-tanks supplied by Government Dockyard.
(e) Includes a charge of Rs. 418 on account of repairs to lighthouse.
(f) Excess in expenditure is due to cost of construction of oil godown, Rs. 322.
(g) Includes a charge of Rs. 164 for repairing lighthouse.
(h) A charge of Rs. 395 for construction of light-keepers' quarters accounts for increase in expenditure.
(i) Excess in cost of oil due to lamp being maintained at full power.
(j) Excess in charges due to preliminary charges for the construction of new lighthouse and for clearing well.
(k) A sum of Rs. 1,078 was charged in 1895–96 for construction of lighthouse shed.
(l) Includes Rs. 1,903 charged for constructing light-keepers' quarters.
(m) No charge appears in 1896–97 on account of cost of oil. The charge for 1895–96 represents cost of supply of oil for two years.

APPENDIX

List of lights on the

Name of light.	Location.	Latitude, N.	Longitude, E.	Number and relative position of lights.	Colour of lights.	Fixed, flashing, intermitting, alternating or revolving.	Interval of revolution or flash or occultation.	Miles visible in clear weather.
Coondapoor ..	On a site 50 feet to the northward of the southern boundary pillar of the port.	13° 37′ 30″	74° 39′ 40″	1	White ..	F.	....	6
Hangarkotta ..	On the masonry column marking the northern limit of the port. The pillar is on the beach or on south side of mouth of the river.	13 27 30 approximately.	74 41 0 approximately.	1	Red ..	F.	....	8
Malpe ..	In the vicinity of the Custom House.	13 20 40	74 42 0	1	White ..	F.	....	6 to 8
Mangalore ..	On a hill above the town, and near some high trees.	12 52 17	74 50 08	1	Do. ..	F.	....	14
Cannanore ..	On the Fort rampart near the beach.	11 51 10	75 21 45	1	Red ..	F.	....	6 to 8
Tellicherry ..	On the Fort wall near the beach.	11 44 50	75 28 30	1	White ..	F.	....	6 to 8
Mahé (French Territory).	On the south side of the entrance to the river, at the foot of the flagstaff.	11 42 10	75 31 10	1	Red ..	F.	....	7
Calicut ..	Near the beach ..	11 15 05	75 45 35	1	White ..	F.	....	14
Narakel (Cochin Territory).	On the beach at mouth of creek, 5 miles to the northward of Cochin.	10 03 0	76 12 0	1	Do. ..	F.	....	10
Cochin ..	On a small mound which formed a bastion of the old fort to the south of the harbour.	9 57 47	76 13 45	1	Do. ..	F.	....	14
Alleppy or Alipee (Travancore Territory).	On the beach, about one cable inland.	9 30 0	76 19 0	1	Do. ..	Rev.	One minute ..	17
Muttum ..	On a rocky promontory 300 yards from sea, known as Muttum Point.	8 07 30	77 18 10	1	Do. ..	F.	....	17

[The candle power of each light is given in units of 1,000 candles to a minimum of $\frac{1}{15}$ or 100 candles; all ligh $\frac{1}{8}$

B.

Coasts of the Madras Presidency.

Arc of illumination. (Bearings are magnetic and from seaward.)	Nature of construction, colour or any peculiarity of light-house.	Height, in feet, of centre of lantern above high water.	Height, in feet, of building from base to vane.	Character and order of illuminating apparatus.	Year lighted.	Candle power in units of 1,000 candles.	Remarks.
180°	Steel mast ..	45	40	6th order dioptric port light.	1st October 1888; present light, 1st Nov. 1891; altered, 15th Sept. 1894.	$\frac{1}{8}$	Exhibited only from 15th September to 31st May.
From N. thro' E. to S., obscured between S. and S. 9° E. by trees and between N. and N. 5° E. and N. 9° E. and N. 14° 30′ E. by St. Mary's Isles.	White masonry column.	12	15	4th order dioptric port light.	9th Nov. 1896.	$\frac{1}{10}$	Being required for coasting vessels during the fair season, will be extinguished yearly between 1st June and 14th September, both days inclusive.
From N. thro' E. to S., shut in between N. and N.E. by trees, N. 53 E. and N. 57 E. by St. Mary's Islands, N. 73 E. to N. 80 E. by St. Mary's Islands.	Steel mast ..	53	50	6th order dioptric port light.	1st October 1888; present light, 1st Nov. 1891.	$\frac{1}{8}$	Exhibited only from 15th September to 31st May.
From N. by E. $\frac{1}{2}$ E. thro' E. to S. by W. $\frac{1}{2}$ W.	Small white masonry tower.	240	65	Dioptric 4th order.	1st October 1842; improved, 1870.	$1\frac{1}{4}$	
Between the bearings of N. W. by W. $\frac{1}{4}$ W. and E. by S. S.	Small masonry tower of a light yellow colour.	64	25 from the rampart.	Dioptric, 6th order, port light.	17th Oct. 1843; improved, 1870; transferred to tower, 1880.	$\frac{1}{10}$	
N.W. thro' E. to S.E.	Small masonry tower.	70	26	Do.	1835; improved, 1870; transferred to tower, 1881.	$\frac{1}{8}$	
All round the compass.	Small white pyramid.	52	7	..	1885 ..	..	Shown only during N.E. monsoon.
From N. 25 W. thro' E. to S. 14 E.	White column ..	102	98	Dioptric, 4th order.	1847; improved, 1881.	$1\frac{1}{4}$	To guide vessels to the anchorage clear of the reef, which lies about 1 mile S. 30° W. from the light. A small red light is exhibited from the head of the pier as a guide for small coasting craft when entering the road stead.
180° from N.N. W. thro' E. to S.S.E.	Flagstaff ..	95	102	Country-made lantern.	1865 ..	..	Is exhibited from 15th May to 30th September.
From N. by W. $\frac{3}{4}$ W. thro' E. to S. by E.	White laterite column.	100	91	Dioptric, 4th order.	1st April 1839; improved, 1868.	$1\frac{1}{4}$	
All round the compass.	Masonry round white tower.	113	115	Catadioptric, 1st order (Holophotal).	1862 ..	..	
From N. 64 W. thro' N. and E. to S. 84 E.	Dark grey granite column, showing black and white horizontal stripes from seaward.	142	72	Dioptric, 1st order.	1875; altered 1st January 1893.	6	Is intended to mark the vicinity of the Crocodile Rock, which lies 3 miles S.W. $\frac{3}{4}$ S. of Cadiapatam Point.

of less power are also shown as $\frac{1}{10}$ except leading lights and occasional lights to which no candle power is assigned.]

List of Lights on the

Name of light.	Location.	Latitude, N.	Longitude, E.	Number and relative position of lights.	Colour of lights.	Fixed, flashing, intermitting, alternating, or revolving.	Interval of revolution or flash or occultation.	Miles visible in clear weather.
Gulf of Manaar. Manapad ..	On summit of Manapad Point.	8° 22′ 30″	78° 6′ 30″	1	Red ..	F.	....	8
Tuticorin ..	On the north extreme of Hare Island or Paundian-tivo, 2½ miles east of Tuticorin town.	8 47 10	78 11 20	1	White ..	F.	....	14
Pámban or Pámban Pass.	On a sand-hill about one mile east of Northern channel.	9 17 14	79 12 38	1	Do. ..	F.	....	14
Tondi ..	About 14 yards due south of the Tondi Sea Custom House.	9 44 45	79 00 30	1	Red ..	F.	....	6 to 8
Point Calimere.	On the point about 30 miles south of Negapatam.	10 18 0	79 51 30	1	Do. ..	F.	....	6 to 8
Negapatam ..	On the jetty near to the river mouth.	10 45 30	79 50 20	1	White ..	F.	....	14
Karikal (French Territory).	At the mouth of the Araselar river.	10 55 0	79 50 35	1	Do. ..	F.	....	9
Cuddalore ..	On cross trees of flagstaff.	11 43 0	79 46 15	1	Red ..	F.	....	6 to 8
Pondicherry (French Territory).	In square, near the beach.	11 55 25	79 49 35	1	White ..	F.	....	14
Do. ..	End of landing stage.	..	..	1	Red ..	F.	....	4
Seven Pagodas or Mahábalipuram.	On a rock half a mile inland marked on chart "Ruined Pagoda" on rock very conspicuous and about 6 miles northward of Sadras.	12 36 55	80 11 31	1	Do. ..	F.	....	10
Madras or Fort St. George.	On the main tower of the Law Courts on the Esplanade, north of the Fort.	13 05 13	80 16 52	1	White ..	Fl.	Double flashing of half-minute periods giving two flashes of about 2 seconds separated by an eclipse of about 3 seconds followed by a long eclipse of 23 seconds.	20
Madras Harbour Lights.	On the towers marking the entrance to the harbour.	Madras Harbour.	Madras Harbour.	2	Red ..	F.	....	6
Madras Leading Light.	Madras Pier T Head.	13 05 44	80 17 18	1	Do. ..	F.	....	5
Do. ..	Custom office Terrace.	13 05 47	80 17 05	1	Green ..	F.	....	5

[The candle power of each light is given in units of 1,000 candles to a minimum of $\frac{1}{10}$ or 100 candles; all lights

Coasts of the Madras Presidency—*cont.*

Arc of illumination. (Bearings are magnetic and from seaward.)	Nature of construction, colour or any peculiarity of lighthouse.	Height, in feet, of centre of lantern above high water.	Height, in feet, of building from base to vane.	Character and order of illuminating apparatus.	Year lighted.	Candle power in units of 1,000 candles.	Remarks.
N.N.E. thro' E. to S.S.W.	White masonry tower.	104	27	Dioptric, 4th order, port light.	June 1888..	$\frac{1}{10}$	Is intended to warn vessels of the dangerous shoal in the vicinity.
All round the compass.	Standstone column, coloured brown, lantern white.	85	91	Dioptric, 4th order.	15th May 1845; improved, 1874; improved, 1893.	1	
Do.	Circular masonry column.	97	72	Do.	21st April 1846; improved, 1860; improved, 1893.	1	As a guide to vessels making for the Pámban channel.
Visible from all directions seaward.	Steel mast ..	63	52	Dioptric, 6th order, port light.	1st October 1892.	$\frac{1}{10}$	
All round the compass.	Steel mast, painted white.	49	..	Do.	1st June 1890.	$\frac{1}{10}$	As a guide to vessels passing between Point Calimere and the shoals to the eastward.
From N. 5 W. thro' W. to S.S.E.	Masonry column, painted white.	79	83	Dioptric, 4th order.	1st August 1846; improved, 1870; improved, 1893.	$1\frac{1}{4}$	
Visible from all directions seaward.	Do.	42	..	Lamp burning cocoanut oil.	1853.	..	
N. thro' W. to S.	Flagstaff ..	130	31	Dioptric, 6th order, port light.	1st July 1889; present light, 5th Oct. 1891.	$\frac{1}{10}$	
Visible from all directions seaward.	Masonry column, painted light yellow.	89	76	Dioptric, 4th order.	1886 ..	..	When surf is heavy, and approach to landing prohibited, a *fixed green* light is shown.
Do.	....	31	..	....	1881 ..	..	
From N. thro' W. to south (180°).	Small grey turret.	119	26	Dioptric, 4th order.	10th July 1887; improved, 1893.	$\frac{1}{2}$	Is intended to warn mariners of the dangerous outlying patches of rock composing the *Tripalore* reef and other reported dangers in its vicinity, to avoid which vessels navigating between Sadras and Covelong should not come into a less depth than 13 fathoms.
Shows all round the compass visible from all directions seaward on the following bearings from N. by E. thro' W. to S. by W.	Tower is an octagonal structure of brick and stone.	166	190	Dioptric, 3rd order.	1st June 1894.	$5\frac{1}{2}$ to 18	Service intensity full power 18,000 candles.
All round the compass.	Masonry towers.	37	25	Port lights, dioptric, 6th order.	1st January 1896.	$\frac{1}{10}$	To guide vessels entering or leaving the harbour at night.
From S. 51° 45′ W. thro' W. to N. 17° W.	Wooden post ..	30	..	Ship's side light, dioptric.	15th Oct. 1888.	..	To guide vessels leaving the harbour or making the anchorage at night.
Do.	Do. ..	60	..	Do.	Do.	..	Do.

of less power are also shown as $\frac{1}{10}$ except leading lights and occasional lights to which no candle power is assigned.]

List of Lights on the

Name of light.	Location.	Latitude, N.	Longitude, E.	Number and relative position of lights.	Colour of lights.	Fixed, flashing, intermitting, alternating, or revolving.	Interval of revolution or flash or occultation.	Miles visible in clear weather.
Pulicat ..	Near the beach ..	13° 25′ 15″	80° 19′ 06″	1	White ..	F.	....	14
Armeghon or Armogham.	On the mainland, village of Moona or Moonapollium.	13 53 08	80 11 47	1	Do. ..	Rev.	Every 45 seconds ..	14
Point Divi or Divy.	About 2 miles north-west of the point.	15 58 55	81 09 25	1	Do. ..	F.	....	12
Masulipatam ..	In the Fort ..	16 09 15	81 09 25	1	Do. ..	F.	....	6
Coringa or Hope Island.	On the southern part of Hope island, Coringa harbour, and distant about 2½ miles from the sea.	16 49 05	82 18 58	1	Do. ..	F.	....	14
Cocanada or Vakalapudi.	4¾ miles north of Cocanada river and about 500 yards from the shore.	17 0 40	82 16 30	1	Do. ..	Rev.	Every 20 seconds ..	14
Cocanada river..	One on the end of the North Groyne, and the other on the end of the South Groyne, entrance to river.	....	....	2	Red ..	F.	....	2½
Sacramento shoal light (temporary).	On the sand half-a mile from the beach near the Kottapoliem beacon.	16 34 40	82 16 30	1	Do. ..	F.	....	10
Santopilly ..	On a small detached hill some distance inland. This distance said to be ¾ of a mile.	18 04 56	83 37 35	1	White ..	F.	....	16
Calingapatam ..	On the point ..	18 19 0	84 07 30	1	Do. ..	Occulting every half-a minute.	27½ seconds light and 2½ seconds eclipse.	14
Baruva ..	On the Port flagstaff.	18 42 30	84 34 0	2	Do. ..	F.	....	About 3
Gopalpur ..	On the mainland 60 yards from low water mark.	19 13 0	84 52 0	1	Do. ..	F.	....	10
Do. ..	On the extreme end of the pier head, port of Gopalpur.	....	....	1	Red ..	F.	....	3

[The candle power of each light is given in units of 1,000 candles to a minimum of $\frac{1}{10}$ or 100 candles; all lights

Coasts of the Madras Presidency—*cont.*

Arc of illumination. (Bearings are magnetic and from seaward).	Nature of construction, colour or any peculiarity of light-house.	Height, in feet, of centre of lantern above high water.	Height, in feet, of building from base to vane.	Character and order of illuminating apparatus.	Year lighted.	Candle power in units of 1,000 candles.	Remarks.
From N. by W. thro' W. to S. by E.	Masonry column with black bands.	68	57	Dioptric, 4th order.	1859; improved, 1870; altered 1881; improved 1893.	1¼	To guide vessels clear of the *Pulicat shoal*.
From N.E. thro' W. to S.E.	White masonry column.	107	111	Dioptric, 4th order, single flash, 45 seconds.	1st January 1853; improved, 1870; present light, 1881; improved, 1893.	3¼	Warns vessels off the *Armeghon shoal*, the shoalest part of which (1¾ fathoms) lies 6 miles off shore.
From N.E. thro' W. to S.	Do.	48	50	Dioptric, 4th order.	1st May 1851; improved, 1870; improved, 1893.	1	Is intended to guide vessels clear of the point.
From S. 26° W. thro' W. to N. 9° E.	Flagstaff ..	69	112	Dioptric, 6th order.	1858; improved, 1870.	⅛	As a guide for vessels to the anchorage.
From N. 5° E. thro' W. to S. 5° W.	Masonry tower, horizontal alternate bands of black and white.	83	94	Dioptric, 4th order.	1817; improved, 1886; improved, 1893.	½	Is intended to guide vessels clear of Sacramento shoal and Gódávari Point.
All round the compass.	White column..	80	76	Dioptric, 4th order, single flash, 20 seconds.	15th January 1879.	3¼	This light is intended as a guide to vessels approaching Cocanada anchorage.
Do.	Wooden post ..	10	..	....	15th September 1886.	..	To guide boats entering or leaving Cocanada river.
From N. 45 E. thro' W. to S. 45 W.	Temporary wooden structure with thatched roof.	25½	16½	Dioptric, 4th order, port light.	1st October 1895.	1/10	
From N E. thro' W. to S.W.	On a small basement on the top of a small hill with a small building by the side of the lantern on the west side.	163·77	31·15	Dioptric, 2nd order; improved, 1893.	1st November 1849; improved, 1871; present light, 1886; improved, 16th Aug. 1888.	4½	Exhibited to warn mariners of the *Santopilly Rocks*, from which this light bears N.W. ⅝ W., distant 6½ miles.
Visible from all directions seaward.	Obelisk of cut stone; column white; outside ladder red.	76	73	Dioptric, 4th order.	15th December 1876; improved, 1st June 1890; altered, 1st Sept. 1895.	½	Intended to warn vessels of a small reef which projects from the point and which should not be passed in less than 8 fathoms when making the port at night.
All round the compass.	Flagstaff ..	46	Shown from yard-arm of flag-staff.	Globular lanterns.	12th October 1895.	..	These lights are occasionally exhibited to indicate the position of the port flagstaff for the purpose of taking up an anchorage and are not to be relied on for purposes of navigation.
From N.E. thro' N.W. to S.W.	Flagstaff, painted white.	54	33	Dioptric, 4th order, port light.	Present light, 1871; 1st March 1892.	⅛	As a guide to the anchorage.
All round the compass.	....	25	..	Country lantern.	1st April 1887.	..	Points out the sea end of the pier.

of less power are also shown as $\frac{1}{10}$ except leading lights and occasional lights to which no candle power is assigned.]

APPENDIX C.

STATEMENT furnishing { (1) Particulars of Inspections made of Lighthouses on the Madras Coasts in 1896–97. (2) Remarks in connection with lightning conductors.

Name of lights.	Officers by whom inspected.	Number of inspections.	Remarks as to lightning conductors.
Coondapoor	Presidency Port Officer	1	
	Port Officer, Mangalore	3	
	Executive Engineer, Lighthouse division ..	1	
Hangarkotta ..	Port Officer, Mangalore	2	
Malpe	Port Officer, Mangalore	2	
	Presidency Port Officer	1	
Mangalore	Presidency Port Officer	1	Lightning conductor not tested during the year.
	Executive Engineer	1	
	Presidency Port Officer	1	
Cannanore	Port Officer, Tellicherry	12	Not tested during the year.
	Executive Engineer and Assistant Engineer jointly.	1	
	Presidency Port Officer	1	
Tellicherry	Sub-divisional Officer, Public Works Department.	4	Tested during the year.
	Presidency Port Officer	1	
Calicut	Executive Engineer, Lighthouse division ..	1	Do. do.
	Do. West Coast division ..	1	
	Superintending Engineer	1	
	Presidency Port Officer	1	
Cochin	Executive Engineer, Lighthouse division ..	1	Do. do.
	Port Officer, Tuticorin	2	
Muttum	Sub-divisional Officer, Public Works Department.	1	Do. do.
	Port Officer, Tuticorin	2	
Manapad	Sub-divisional Officer, Public Works Department.	2	Do. do.
	Sub-Engineer, Lighthouse division	1	
	Presidency Port Officer	1	
Tuticorin	Executive Engineer, Lighthouse division ..	1	Do. do.
	Presidency Port Officer	3	
Pámban	Executive Engineer, Madura division ..	1	Not tested during the year.
	Do. Lighthouse division ..	1	
Tondi	Port Officer, Pámban	4	
	Port Officer, Negapatam	12	
Point Calimere ..	Divisional Officer, Public Works Department ..	1	
	Presidency Port Officer	1	
Negapatam	Executive Engineer	1	Tested during the year.
Cuddalore	Personal Assistant to Presidency Port Officer ..	1	
	Presidency Port Officer	1	
Seven Pagodas ..	Executive Engineer	1	Do. do.
	Do. Lighthouse division ..	1	
	Executive Engineer, Lighthouse division ..	1	
	Presidency Port Officer	1	
Pulicat	Superintending Engineer	1	Not tested during the year.
	Executive Engineer	1	
	Presidency Port Officer	1	
	Sub-divisional Officer	1	
Armeghon	Do. Lighthouse division ..	1	Do. do.
	Executive Engineer	1	
Point Divi	Port Officer, Masulipatam	12	Do. do.
Hope Island	Port Officer, Cocanada	6	Do. do.
	Presidency Port Officer	1	
Vakalapudi	Port Officer, Cocanada	8	Do. do.
	Assistant Engineer	1	
	Port Officer, Cocanada	4	
Sacramento Shoal ..	Presidency Port Officer	2	
	Executive Engineer, Lighthouse division ..	1	
	Port Officer, Bimlipatam	6	
Santopilly	Presidency Port Officer	1	Do. do.
	Presidency Port Officer	1	
Calingapatam ..	Executive Engineer, Lighthouse division ..	1	Do. do.
	Port Officer, Gopalpur	2	
Gopalpur	Executive Engineer, Lighthouse division ..	1	Do. do.
	Presidency Port Officer	..	

N.B.—Lights in the immediate charge of local Port Officers were frequently inspected by such Officers.

APPENDIX D.

STATEMENT showing the Sanctioned Establishments of Lighthouses on the Madras Coasts as they stood on the 31st March 1896.

Lights.	Superintendents.			Head Lightkeepers.			Lightkeepers.		
	First class.	Second class.	Third class.	First class.	Second class.	Third class.	First class.	Second class.	Third class.
	Rs. 100.	Rs. 70.	Rs. 50.	Rs. 15.	Rs. 12.	Rs. 10	Rs. 9.	Rs. 8.	Rs. 7.
Coondapoor	..	..	..	..	..	(a) 1	..	..	(b) 1
Hangarkotta	..	..	..	..	..	(a) 1	..	..	(b) 1
Malpe	..	..	..	..	..	(a) 1	..	..	(b) 1
Mangalore	..	..	..	..	..	(c) 1	..	1	1
Cannanore	..	..	..	..	..	(a) 1	..	..	1
Tellicherry	..	..	..	..	..	(a) 1	..	1	..
Calicut	..	..	..	..	..	(c) 1	..	1	1
Cochin	..	..	..	..	..	(c) 1	..	1	1
Muttum	..	1	..	1	..	..	1	1	2
Manapad	..	..	1	..	..	1	..	1	1
Tuticorin (Hare Island)	See below.								
Pámban	..	..	..	..	..	(c) 1	..	1	1
Tondi	..	..	..	..	..	(a) 1	..	1	..
Point Calimere	..	..	..	..	..	(c) 1	..	1	1
Negapatam	..	..	..	..	..	(c) 1	..	1	1
Cuddalore	See below.								
Seven Pagodas	..	1	..	..	1	..	1	1	1
Madras	(d) 1	..	..	1	..	..	3	1	1
Pulicut	..	1	..	..	1	..	1	1	1
Armeghon	1	..	..	1	..	..	1	1	2
Point Divi	..	1	..	..	1	..	1	1	2
Masulipatam	..	..	..	..	..	1	..	1	..
Coringa or Hope Island	..	1	..	..	1	..	1	1	(l) 2
Sacremento shoal	..	..	..	(e) 1	(f) 1	..	..	..	..
Vakalapudi	..	(g) 1	..	..	1	..	1	1	(h) 1
Santopilly	..	1	..	1	..	..	1	1	1
Calingapatam (k)	..	..	(i) 1	1	1	..	1	..	(j) 1
Gopalpore	..	..	..	..	..	1	..	1	..

(*a*) *Plus* charge allowance of Re. 1.
(*b*) Temporary for 8 months (October to May).
(*c*) *Plus* charge allowance of Rs. 2.
(*d*) *Plus* house allowance of Rs. 25.
(*e*) Temporarily. *Plus* charge allowance of Rs. 2 and provision allowance of Re. 1.
(*f*) Temporarily. *Plus* provision allowance of Re. 1.
(*g*) *Plus* flag signalling allowance of Rs. 10.
(*h*) Also a flag signaller on Rs. 8 with a provision allowance of Re. 1.
(*i*) *Plus* charge allowance of Rs. 20.
(*j*) Rising to Rs. 9.
(*k*) The whole of Calingapatam establishment is sub. *pro tem.*
(*l*) Also two water-boys on Rs. 7 each with provision allowance of Re. 1 each.

NOTE.—The lightkeepers on entertainment will receive Rs. 7 per mensem during their first year of service, after which, if well reported on, they will receive Rs. 8 during their second year and Rs. 9 thereafter. All lightkeepers at Muttum, Manapad, Seven Pagodas, Armeghon, Point Divi, Hope Island, Vakalapudi and Santopilly receive an allowance of Re. 1 per mensem as compensation for the difficulty and expenses connected with obtaining supplies.

Amalgamated Establishment.

Lighthouses.	Head Lightkeepers and Head Signallers.	Lightkeepers and Signallers.				Total staff.
	Rs. 20.	Rs. 11.	Rs. 10.	Rs. 9.	Rs. 8.	
Tuticorin	1	1	1	1	1	53
Cuddalore	1	..	..	2	..	

Temporary—Lighthouse mechanic, Rs. 80 per mensem, rising by annual increments of Rs. 5 to Rs. 100.

APPENDIX E.

STATEMENT showing the consumption of oil and cost of Light-house stores for the official years 1895–96 and 1896–97.

Name of Light.	Consumption of oil.		Cost of stores.		Remarks.
	1895–96.	1896–97.	1895–96.	1896–97.	
	GALLONS.	GALLONS.	RS. A. P.	RS. A. P.	
Hangarkotta	..	29	....	1053-0-6	Light exhibited in November 1896.
Coondapoor	59	57	34 8 0	11 0 10	
Malpe	61	52	34 10 5	24 7 6	
Mangalore	215	202	81 1 2	142 9 10	
Cannanore	66	49	5 8 5	4 9 3	
Tellicherry	65	49	67 13 3	20 14 8	
Calicut	214	214	157 4 2	155 6 7	
Cochin	208	228	99 13 9	153 14 3	
Muttum	867	856	427 3 1	753 3 8	
Manapad	88	83	31 3 9	153 14 6	
Tuticorin	215	219	161 12 5	162 6 1	
Pámban	207	210	128 6 4	147 13 10	
Tondi	74	76	20 15 10	24 7 6	
Point Calimere	52	50	5 8 4	3 1 4	
Negapatam	205	195	142 6 9	212 0 3	
Cuddalore	60	61	5 13 0	2 15 9	
Seven Pagodas	226	227	(a) 512 1 0	134 15 5	
Madras	800	975	227 12 2	267 13 5	In 1896–97 light was maintained at full power throughout the year.
Pulicat	207	203	265 5 1	138 3 7	
Armeghon	213	213	237 4 10	230 1 11	
Point Divi	206	223	85 9 0	140 5 5	
Masulipatam	57	58	66 9 10	30 2 0	
Hope Island	323	299	163 14 3	143 6 11	
Sacramento	48	90	87 5 8	98 6 5	
Vakalapudi	221	220	126 11 5	94 2 10	Light exhibited from 1st October 1895.
Santopilly	790	821	414 12 7	371 7 4	
Calingapatam	207	366	49 4 5	219 8 7	Improved and exhibited on 1st September 1895.
Gopalpur	66	66	53 1 8	9 0 4	
Total ..	6,020	6,391	3,693 12 7	~~3,986 8 0~~ 4903-8-6	

(a) Includes cost of 100 ruby chimneys.

Any large excess in cost of stores is due to supplies of additional oil tanks and stands; decrease, in the same way, to supplies of tanks and glass cylinders in previous year.

The aggregate consumption is slightly in excess of the previous year, owing to establishment of a new light at Hangarkotta; maintaining the Madras light at full power throughout the year; and to small increases in consumption at some stations. The increases in consumption are all at lights fitted with the Douglass burners, and indicate better attention on the part of keepers in maintaining the flame. At the minor lights which require no regular watch, the decrease is due to closer supervision over expenditure. The value of oil delivered at the various stations is taken at an average of Re. 1 per gallon, exchange being 1*s.* 4*d.*; the cost last year being Rs. 6,020, this year Rs. 6,391. The actual debits in the accounts being respectively Rs. 6,738 and Rs. 5,991, the small discrepancies are due to difference in exchange and rates of freight.

Endn/ Mar 1361/97

No. 1815/368 G

Presidency Port Office,

Madras, 20th October, 1897.

1P

From

Commander H. A. Street, R.I.M.,

Presidency Port Officer,

MADRAS,

To

The Secretary to Government,

Marine Department,

CHEPAK.

Sir,

I have the honour to forward herewith the Annual Report on the Lights and Lighthouses on the Coasts of this Presidency for the Official Year 1896/97.

I have the honour to be,

Sir,

Your Obedient Servant,

H. Atheet

Commdr:, R.I.M.,

Presidency Port Officer.

Marine Department

No 6778 & 4 18-11-97

Memo:

Letter from the Presidency Port Officer No 1815/368 & 4 20th October 1897

It is observed from the report which accompanies the Presidency Port Officer's letter quoted above that there are great inequalities in the consumption of oil by lights of the same class. Thus the consumption of dioptric port lights of the 6th order ranges from 49 to 76 gallons, that of the 4th Order from 66 to 366 gallons; while as regards lights of the 1st, 2nd and 3rd order, and in other cases also, the consumption bears no relation to the candle power. The accompanying statement illustrates what is said above.

To be returned

2. The

2. The undersigned is directed to ask for an explanation of these differences — also the cause of difference in the total cost of stores as given in columns 4 and 5 of Appendices E and A respectively - viz Rs 3830-8- in the former and Rs 4903-8-6 in the latter.

P Bell 16.11.97

M.

R.S. 1/12

To

The Presidency Port Officer.

with statement to be returned.

J P 19/11/97

Marine (1897) Department.

CURRENT No. 1517

From

The Presidency Port officer, Madras

Order

No. 1854/414 G

Dated *24 November 1897*

Received } 29-11-97

Registered }

Enclosures *one*

Spare copies

SUBJECT.

Furnishing explanation regarding the differences in the consumption of oil at certain lights.

BACK PAPERS.

No.	Date.

FURTHER PAPERS.

No.	Date.

Heading

No. 1854 G
414

Presidency Port Office,

Madras, 24th November 1897.

From

Commander H. A. Street, R,I,M.,

Presidency Port Officer,

Madras,

To

THE SECRETARY TO GOVERNMENT,

MARINE DEPARTMENT,

CHEPAK.

Sir,

With reference to Marine Department, Memorandum, No.677 E, dated 18th November 1897, (enclosure herewith returned) I have the honour to remark as follows:--

X

(a) The method of describing lights as of different "orders" is gradually being abandoned in England, as it gives no idea of the actual power of a light, the distinction being based merely on the focal length, which is only one of the factors which determines the intensity.

(b) The consumption of oil is dependent on the class and size of burners used, and similar burners are used in 1st, 2nd and 3rd order lights in this Presidency. The variations in consumption in similar burners are due principally to state of ventilation, and the Madras Light being better ventilated than the other two, consumes more oil. The consumption also varies with different keepers and with the same keepers using different burners.

(c) There is no 4th Order Light which consumes only 66 gallons, but there is a 4th Order Port Light which does so. This is a different kind of light, and is fitted with a small single-wick burner, whereas the 4th Order

+ This is the method adopted by the P.O. since [illegible]

Light alluded to as consuming 566 gallons, is fitted with a large two-wick Douglass burner, and the consumption calls for no remark. There are in use, round the coast, eight different kinds of burners, and the variations in consumption are due to this fact.

(d) To establish a ratio between consumption of oil and candle-power, the lenticular apparatus and burners of each light must be of similar pattern, and, even then, change of burners, the prevalence of strong wind or the contrary, and differences in ability of the keepers, will cause small discrepancies. Oil written off as wastage, and losses in transit, for which recoveries are made, are also included in expenditure. The consumption of each light is very carefully scrutinised monthly, and the quantities of oil expended are in no case excessive. It is very inadvisable to rigidly fix consumption at any station.

(e) The lights numbered 14 to 26 in the list accompanying your Memorandum are of various characters. The high candle power of Armeghon and Vakalapudi is due to their being flash lights; the low power of Seven Pagodas to its colour; that of Calingapatam and Hope Island to their special character.

(f) The increase in cost of stores is due to the purchase of the Apparatus for Hangarkotta as explained in the foot-note (a) to Appendix A.

(g) The cost of the up-keep of the Madras Harbour Entrance Lights is shown in the Madras Port Fund Account as one of the port charges, as the lights are not maintained for purposes of general navigation.

I have the honour to be,

Sir,

Your Obedient Servant,

Commdr:, R.I.M.,
Presidency Port Officer.

Telephone

Telephone

To Secretary, Marine Dept

To P. P. O

See annual report of lights. Appendix A shows Expenditure on Stores at Masulipatam as Rs 153-14-6 whereas Appendix E shows Rs 53-11-6. Which is Correct?

(D) W B Lewis
M

Sent by messenger as no reply can be got by Telephone.

5th 7-11-97.

No. A 1051-52 Mar 23-12-97

miscellaneous against
Hangorkota has been
shown under stores
Appendix E.

Rec'd
8/12/97.

Cable

Had you not letter
for 6.000
find this
explanation first.

Wired by
letter

Lost light.

M Draft thereon submitted.
R.S.
15 Nov 97

M C. No 1517 is the L.S.O.'s
reply. For orders whether the
explanations are to be accepted.
The tone is that of deprecating
inquiry on behalf of Govt.
R.S.
6 Dec 97.

I wrote by D. Mail ordered
Lost Light. Yes. There is
a discrepancy in cost of store
at Narcondam which will

Telephone Instant

From
The Presidency Port
officer

To
The Secretary
Marine Dept

Reply to your mes-
sage of yesterday.
In appendix E,
of the annual report
of Lights of 1896-97,
Correct figure
against Narcondam
is Rs 153-14-6. The
total with them be
Rs 3930-8-0, the
sum of Rs 79-14-9
being cost of petty
stores shown
under Contingencies