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TAMIL NADU ARCHIVES

GOVERNMENT OF TAMIL NADU

P.W.D. DEPARTMENT

G.O. No.	2791-92	Press.
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Dated	8-7-1878	197.

Not to be folded or roughly handled

2731
GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

8th July 1878, No. 2,791 W.

Buildings and Roads.
Civil Works.

Read the following paper:—

No. 76. Proceedings of the Government of India in the Public Works Department (Civil Works—Irrigation), dated Simla, 24th June 1878, No. 148 I.

Copy of the following, with copy of enclosures, forwarded to the Government of Madras, in the Public Works Department, for information, with reference to its letter, No. 342 W, dated the 2nd July 1877.

(By order,)

(Signed) G. T. SKIPWORTH, Captain, R.E.,
Asst. Secy. to the Govt. of India.

From P. DEJOUX, Esq., Executive Engineer, Cement Experiments Division, to the Superintending Engineer, South-Western Circle, dated Calcutta, 31st May 1878, No. 2,079.

With reference to your No. 2,338, dated 8th August last, and its enclosures herewith returned, I have the honor to submit my remarks on the paper of Major-General Morgan, dated 14th June 1877, printed in the Madras Government Proceedings, Nos. 13 and 14, of July 1877.

2. The following explanations show the reasons why my remarks are not submitted earlier:—

1st.—On the 31st August 1876, by my letter No. 938, I requested you to inquire whether the Government of Madras would feel disposed to send me for test a cask of the Portland Cement used in the Madras Harbour Works, and also a copy of the specification of the process adopted by Major-General Morgan for its manufacture.

2nd.—On the 24th October 1876 I received a letter (copy annexed) from the Superintendent, Madras Harbour Works, advising the despatch of a box containing the cement in question, and requesting me specially to test it with sand in different proportions, as it appeared to him to be incapable of bearing so much sand as in Portland Cement imported from England.

3rd.—It must be mentioned here that the copy of the specification above referred never came to hand from Madras.

4th.—Just as the cement arrived on the 3rd November 1876 I was very busy with the Ganges Delta Canal Survey Division Works. I however commenced experiments three days

after receipt, and partially reported their results in my Quarterly Progress Report, No. 1,008, dated 3rd March 1877, as per following extract:—

“General Morgan's Cement from Madras.”

“13. This cement was sent for test by the Superintendent of the Madras Harbour Works in October last. I made forty-seven bricks, both pure and mixed in various proportions with sand.

“The appended Statement D shows the results of the trials already made, and a complete report will be furnished as soon as more bricks are tested after a longer period.

“This seems necessary to be done, as some curious results have been obtained which renders the quality of the cement dubious.

“It will be seen from the statement that bricks made with one and two parts of sand and one of cement are less hard after twenty-one days than after fifteen; however, they gain in strength after one and two months.

“Bricks made with three parts of sand and one of cement are the same after twenty-one days than after fifteen, but they gain in strength after two months.

“Cement pure is much weaker after a month than after fifteen days, as shown by specimens Nos. 802, 803, and 804.”

5th.—My reason for not sending any special report on the experiments were fully explained as above shown, and I accordingly intended to test the remaining nine bricks after six months more, in order to mark the increase of strength.

6th.—Unfortunately, however, my deputation to Simla on special duty prevented my doing so. The paper of Major-General Morgan was received only a few days before my departure, and it was only very lately that I could again take the matter in hand. The nine bricks were tested, the good results of which will be seen from the annexed Statement A.

3. I must now reply to the criticisms of Major-General Morgan about my not knowing how to test cement, &c.

I. Major-General Morgan says that I use more water than that used by experts at home.

To this I say that while he is quite right on the one hand in saying so, he is wrong on the other, because both experience and practice (notwithstanding his remark of my having unpractised hands) confirm the fact that in a country like India, in which there is a great amount of heat as compared to the climate of England, it is necessary, in order to ensure good results and sound bricks, *especially when they are made by Native workmen*, to use more water than at home.

II. However, with reference to the experiments criticised, I must say that there was a clerical error in the tables attached to the report to which Major-General Morgan alludes; the percentage of water should have been entered at 27 instead of 37. In fact there were some Sahebgunge cements extra burnt in which I was obliged to use 37 per cent. some days previous to my experimenting on the Madras Cement, and by an oversight those figures (37) were entered throughout the two tables.

The cement and sand bricks were correct at 25 per cent., and I consider it on an average the best proportion of water to be used in India.

III. At any rate bricks made by an European workman very carefully with 20 or 27 per cent. of water in India will show very little difference in strength.

4. I now proceed to explain why I said before that on account of some curious results the quality of the cement was dubious, and why I was obliged to wait longer to give a definite opinion.

5. The fact of General Morgan's taking out a patent for the manufacture of Portland Cement induced me to suppose that he had made some additions to the usual components of Portland by means of alkalis and other chemicals.

I have myself made numerous experiments with carbonates of baryta, soda and potash, in which I sometimes succeeded, and at other times obtained cements possessing for days and even months a first-rate hardness, but of which the strength kept decreasing afterwards steadily, particularly when mixed with sand.

I was therefore quite justified, in presence of the curious results obtained at first, to have some doubts about the future strength of the cement.

Had Major-General Morgan sent me a copy of the specification of his process, it is probable that such doubts would not have originated, because by being lately furnished with a copy of it

from the Home Department, as annexed, I find that the Madras Cement is manufactured with SHELLS, which are pure carbonates of lime and clay, the ordinary components of Portland.

6. Portland Cement is manufactured at home, and in fact all over the world with any kind of LIMESTONE or carbonate of lime and clay; sometimes the lime is burnt before it too hard, and at other times it is finely ground in its raw state and mixed with clay.

7. Under such circumstances, I must say that I am surprised that a patent has been taken out for such a process, as the cement in question is no more patentable than the Portland Cements I made from the last three years very successfully, which are obtained from mixtures of—

Burnt kunkur, lime and clay (when lime is in excess in the kunkur);

Raw “ “ and burnt fat lime (when clay is in excess);

Raw “ “ and clay (when lime is in excess);

“ “ “ and chalk or ground fat lime (when lime is in excess);

and many other mixtures of burnt and raw fat limes (of every description) and clay.

8. In conclusion I must admit that on the whole Major-General Morgan's Cement, according to the sample sent to me, is of very good quality, and it can be compared in every respect (either pure or mixed with sand) with the Portland Cement imported from England.

No. 1,777.

MEMORANDUM.

FORWARDED, in original, to Chief Engineer, Bengal, Irrigation Branch, with reference to Bengal Government No. 2,671 I of 7th August 1877.

(Signed) J. M. HEYWOOD, Major, R.E.,
4th June 1878. Offg. Supg. Engr., South-Western Circle.

No. 2,050 I.

COPY, together with copy of its enclosures, forwarded to the Secretary to the Government of India, Public Works Department, for information, with reference to his No. 133 I of the 1st instant.

(By order, &c.)

PUBLIC WORKS DEPARTMENT,
8th June 1878.

(Signed) W. B. HOME,
Assistant Secretary.

From the Superintendent, Madras Harbour Works, to the Executive Engineer, Cement Experiments Division, Calcutta, dated Madras, 24th October 1876, No. 391 M.

I HAVE the honor to send by the P. and O. Steamer *Poona* a box containing General Morgan's Cement for you to test. I have been requested to do this by the Government of Madras, vide G.O., No. 2,486, dated 18th September 1876. I shall be glad if you will apply tests to the cement when mixed with sand in different proportions, as it appears to be unable to carry so much sand as Portland Cement from England.

I shall be much obliged if you will favor me with a copy of the results.

Specification.

AN improved mode of rendering shell lime hydraulic.

The shell must be ground so finely as to pass through a 50 gauge sieve, then to one part by measure of moist blue clay from A in the tertiary deposit add one part of ground shell, mix both together intimately in a water tank until of the consistence of thick cream, then dry, make into bricks and pack with layers of coke in a double truncated cone kiln about 30 feet high and an average breadth of 8 feet. To burn the bricks to clinker it is necessary to use one quarter ton of

the best silvery coke to produce one ton of clinker, which when burnt should be of a dark green color. The clinker should at once be ground, passed through a 50 gauge sieve, and then exposed to air for 60 days, being frequently turned over when it becomes weathered and obtains its full tensile strength of 500 lbs.; the square inch often being seven days in water. The light-colored cement that comes from the kiln may be ground and mixed with the dark in the proportion of 10 per cent. light to 90 per cent. dark, but any cement unburnt of a pink color should be reduced, or 75 per cent. light to 25 per cent. dark, the proportion of lime to clay should be reduced, or 75 per cent. by measure of lime to 100 per cent. by measure of clay; but it is most economical to make the very strongest cement, as the carriage then costs less. The clay used must be very pure, free from sand, stones, vegetable matter, and other impurities; this cement being made of the very purest materials, is the strongest cement ever discovered.

(Signed) H. R. MORGAN, Major-General,
Madras Army, Retired.

D.

Statement of Experiments made with Michele's Testing Machine showing the Tensile Strength of Madras Cement.

Number	Composition of Mortar	Age of Mortar	After what time it was immersed in water.	How long immersed.	Weight in lbs. supported before breaking on an area of 1 1/2 x 1 1/2.	Breaking weight per square inch.	Quantity of water used in mixing the Cement.
					LBS.	PER CENT.	
706	Madras Cement pure	15	24	6	580	257 1/2	27
707	Do. do.	15	24	6	630	280	27
708	Do. do.	15	24	6	620	275 1/2	27
709	Do. do.	15	24	13	820	364	27
710	Do. do.	15	24	13	750	333	27
711	Do. do.	15	24	13	700	310	27
712	Do. do.	15	24	13	570	253	27
713	Do. do.	15	24	13	580	257 1/2	27
714	Do. do.	15	24	13	560	248 1/2	27
715	Do. do.	15	24	13	560	250 1/2	27
716	Do. do.	15	24	13	600	204 1/2	25
717	Do. do.	15	24	13	450	200	25
718	Do. do.	15	24	13	450	213	25
719	Do. do.	15	24	13	450	151	25
720	Do. do.	15	24	13	450	186 1/2	25
721	Do. do.	15	24	13	450	155 1/2	25
722	Do. do.	15	24	13	450	168 1/2	25
723	Do. do.	15	24	13	380	310	25
724	Do. do.	15	24	13	700	355 1/2	25
725	Do. do.	15	24	13	600	160	25
726	Do. do.	15	24	13	360	146 1/2	25
727	Do. do.	15	24	13	380	160	25
728	Do. do.	15	24	13	380	137 1/2	25
729	Do. do.	15	24	13	310	137 1/2	25
730	Do. do.	15	24	13	310	151	25
731	Do. do.	15	24	13	340	204 1/2	25
732	Do. do.	15	24	13	460	181	25
733	Do. do.	15	24	13	430	200	25
734	Do. do.	15	24	13	450	133	25
735	Do. do.	15	24	13	200	120	25
736	Do. do.	15	24	13	270	124 1/2	25
737	Do. do.	15	24	13	260	133	25
738	Do. do.	15	24	13	300	128 1/2	25
739	Do. do.	15	24	13	290	128 1/2	25
740	Do. do.	15	24	13	410	182	25
741	Do. do.	15	24	13	390	173	25
742	Do. do.	15	24	13	420	186 1/2	25

A.

Statement of Experiments made with Michele's Testing Machine showing the Tensile Strength of Major-General Morgan's Patent Portland Cement.

No.	Composition of Mortar	Age of Mortar	After what time it was immersed in water.	How long immersed.	Weight in lbs. supported before breaking on an area of 1 1/2 x 1 1/2.	Breaking weight per square inch.	Quantity of water used in mixing the Cement.	Remarks.
825	Cement pure	18	24	18 — 24	Does not break at 1,000 lbs.	..	27	This cement could not be tested higher than 1,000, as my Michele's Testing Machine does not go further, and my Adin's machine is out of order.
826	Do. do.	18	24	18 — 24	Do. do.	..	27	Do. do.
827	Do. do.	18	24	18 — 24	Do. do.	..	27	Do. do.
769	Cement ..	1	18	24	1,900	444 1/2	25	Broken on being left for about 2 minutes only with the full strength of 1,000 lbs.
..	Sand ..	1	..	..	..	..	..	Do. do.
770	Cement ..	1	18	24	1,000	444 1/2	25	Do. do.
773	Do. ..	1	19	24	900	396 1/2	25	Do. do.
774	Sand ..	2	..	..	..	..	..	Do. do.
775	Cement ..	1	18	24	880	387 1/2	25	Do. do.
776	Do. ..	1	18	24	800	352 1/2	25	Do. do.
777	Sand ..	3	..	..	..	..	..	Do. do.
777	Cement ..	1	18	24	790	347 1/2	25	Do. do.

(Signed) P. DEJOUX,
Ex. Engr., Cement Experiments Division.

No. 77. ORDER THEREON, 8th July 1878, No. 2,791 W.

COMMUNICATED to Major-General Morgan with reference to his letter of the 14th June last.

2. Ordered that the following letter be sent:—

(Here enter No. 2,792 W, dated 8th July 1878.)

(True Extract.)

(Signed) E. A. FOORD, Colonel, R.E.,
Secretary to Govt., P.W.D.

(True Copy.)

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

To General H. R. Morgan.
To District Engineers.
To the Chief Engineer for Irrigation.
" Consulting Engineer for Railways.
" Chief Engineer and Manager, Madras Irrigation and Canal Company.
" Superintendent, Madras Harbour Works.

Exd. A. F. Goodall.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1878) Madras.
PUBLIC WORKS.

GENERAL H. B. MORGAN.

&c. &c. &c.

Done July 6th.

Read

Read

Encl.

G. O., 8th July 1878, No. 2,792 W.

JULY.

Nos. 76-77.

General Morgan's Copy — Ordered that the Government of India be addressed regarding their report on —, and that these orders be communicated to General Morgan.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 2,792 W.

No. 78.

FROM

THE SECRETARY TO THE GOVERNMENT OF MADRAS,
Public Works Department,

TO

THE SECRETARY TO THE GOVERNMENT OF INDIA,
Public Works Department.

SIR,—In acknowledging receipt of the correspondence forwarded with Captain Skipwith's docket, No. 148 I, of the 24th June 1878, I am directed to suggest that the concluding paragraph of the letter from Mr. Dejoux, No. 2,079, of the 31st May 1878, may be communicated to all the Governments and Officers to whom the extracts forwarded with Circular No. 18 of 2nd May 1877 were sent.

I have the honor to be,

Sir,

Your most obedient servant,

Colonel, R.E.,
Secretary to Govt., P.W.D.

OOTACAMUND,
8th July 1878.

Encl. A. F. Goodall.
Spare Copies

BUILDINGS AND ROADS
CIVIL WORKS.

GOVT. OF INDIA

PUBLIC WORKS.

To

THE SECRETARY TO THE
GOVERNMENT OF INDIA.

Dated July 5th,

From

Head

Encl.

G. O., 8th July 1878, No. 2791 W.

JULY.

No. 78.

Requesting the concluding paragraph
Mr. De-joux's letter regarding
Morgan's Cement may be communicated
all Governments and Officers concerned.

All communications
should be addressed
to the Secretary.

No. 148

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

Civil Works.
Irrigation.

Simla, 24th June 1878.

Copy of the following with copy of
enclosures, forwarded to the Govern-
ment of Madras in the Public Works
Department for information, with
reference to its letter P. 342 W dated the
2nd July 1877.

By order,

Ray Shipman

Capt. R.C.

Asst. Secy to the Govt of India.

P. 2077.

From, The Executive Engineer,
Cement Experiments Divn.

To, Major J. M. Keywood R.C.
Suptg. Engr. South Western Circle

Dated Baluchta, Sealdah } the 31st May 1878.
Balliaghatta Road, P. 138

Sir,

With reference to your P. 2338 dated

2nd August last and its enclosures
herewith returned, I have the honor to
submit my remarks on the Paper of
Major General Morgan dated 14th June
1877, printed in the Madras Government
Proceedings Nos 13 and 14 of July 1877.

2. The following explanations show
the reasons why my remarks are not
submitted earlier.

1st. On the 31st August 1876 by my letter
No 938, I requested you to enquire whether
the Government of Madras would
be disposed to send me for test a
cask of the Portland Cement used in the
Madras Harbour Works, and also a
copy of the specification of the process
adopted by Major General Morgan for
its manufacture.

2nd. On the 24th October 1876, I received
a letter (copy annexed) from the Super-
intendent, Madras Harbour Works
advising the despatch of a Box contain-
ing the Cement in question, and requesting
me specially to test it with sand in different
proportions, as it appeared to him to be
incapable of bearing so much sand as
in Portland Cement imported from England.

3rd. It must be mentioned here that
the copy of the specification above
referred never came to hand from
Madras.

4th. Just as the Cement arrived on the
3rd November 1876, I was very busy with
the changes of the Canal Survey Division
works. I however commenced experi-
ments 3 days after receipt, and partially
reported their results in my Quarterly
Progress Report No 1008 dated 3rd March
1877 as per following Extract.

General Morgan's Cement from Madras

13. This Cement was sent for test
by the Superintendent of the Madras
Harbour Works in October last. I made
27 Bricks both pure and mixed in
various proportions with sand.

The appended Statement D shows the
results of the trials already made, and
a complete report will be furnished
as soon as more Bricks are tested
after a longer period.

This seems necessary to be done, as
some curious results have been obtained

which

which renders the quality of the Cement "dubious".

It will be seen from the Statement that Bricks made with 1 and 2 parts of sand and 1 of Cement are less hard after 21 days than after 15; however, they gain in strength after 1 and 2 months.

Bricks made with 3 parts of sand and 1 of Cement are the same after 21 days than after 15, but they gain in strength after 2 months.

Cement pure is much weaker after a month than after 15 days, as shown by specimens Nos 802, 803 and 804.

5th My reason for not sending any special report on the experiments were fully explained as above shown, and I accordingly intended to test the remaining 9 Bricks after 6 months more, in order to mark the increase of strength.

6th Unfortunately however my deputation to Lima on special duty prevented my doing so. The paper of Major General Morgan was received only a few days before my departure and it was only very lately that I could again take the

the matter in hand. The 9 Bricks were tested, the good results of which will be seen from the annexed Statement A.

3. I must now reply to the criticisms of Major General Morgan about my not knowing how to test Cement &c. &c. I. Major General Morgan says that I use more water than that used by experts at home.

To this I say that while he is quite right on the one hand in saying so, he is wrong on the other, because both experience and practice (notwithstanding his remark of my having unpractised hands) confirm the fact that in a country like India, in which there is a great amount of heat, as compared to the climate of England, it is necessary, in order to ensure good results and sound Bricks, especially when they are made by native workmen, to use more water than at home.

II. However, with reference to the experiments criticised, I must say that there was a clerical error in the Tables attached to the Report to which Major General Morgan alludes; the percentage

percentage of water should have been entered at 27 instead of 37. In fact there were some lake-burnt Cements extra burnt in which I was obliged to use 37 per cent, some days previous to my experimenting on the Madras Cement, and by an oversight those figures (37) were entered throughout the 2 Tables.

The Cement and Sand Bricks were correct at 25 per cent, and I consider it on an average, the best proportion of water to be used in India.

III. At any rate Bricks made by an European workmen very carefully with 20 or 27 per cent of water in India will show very little difference in strength.

4. I now proceed to explain why I said before that on account of some curious results the quality of the Cement was dubious, and why I was obliged to wait longer to give a definite opinion.

5. The fact of General Morgan's taking out a Patent for the manufacture of Portland Cement induced me to suppose that he had made some additions to the

usual components of Portland by means of Alkalis and other Chemicals.

I have myself made numerous experiments with Carbonates of Baryta, Soda and Potash, in which I sometimes succeeded and at other times obtained Cements, possessing for days and even months, a first rate hardness, but of which the strength kept decreasing afterwards steadily, particularly when mixed with sand.

I was therefore quite justified in presence of the curious results obtained at first, to have some doubts about the future strength of the Cement.

As a Major General Morgan sent me a copy of the Specification of his Process, it is probable that such doubts would not have originated, because by being lately furnished with a copy of it from the Home Department as annexed, I find that the Madras Cement is manufactured with shells which are pure Carbonates of Lime and Clay, the ordinary components of Portland.

6. Portland Cement is manufactured

at home, and in fact all over the world with any kind of Lime stone or Carbonate of Lime and Clay; sometimes the Lime is burnt before if too hard, and at other times it is finely ground in its raw state and mixed with clay.

7. Under such circumstances I must say, that I am surprised that a patent has been taken out for such a process, as the Cement in question is no more patentable than the Portland Cements I made from the last three years very successfully, which are obtained from mixtures of burnt Kunkur Lime and clay (when Lime is in excess in the Kunkur)

Burnt Kunkur Lime & burnt fat Lime (when clay is in excess)

Raw Kunkur Lime and Clay (when Lime is in excess)

Raw Kunkur Lime & chalk or (when Lime is in excess) ground fat Lime.

and many other mixtures of burnt and raw fat Limes (of every description) and clay.

8. In conclusion, I must admit that on

on the whole Major General Hodgkin's Cement, according to the sample sent to me, is of very good quality and it can be compared in every respect, (either pure or mixed with sand) with the Portland Cement imported from England.

I have &c
Signed P. Dejour
Executive Engineer
Cement Experiments D.

Memo: P. 1777
The 4th June 1878.

Forwarded in original to Chief Engineer Bengal, Irrigation Branch, with reference to Bengal Government P. 2671 of 7th August 1877.

Signed P. M. Heywood Major R.E.
Chief Supg Engr. South Western Prov.

P. 2050.

Copy, together with copy of its enclosure, forwarded to the Secretary to the Govt. of India Public Works Department for information with reference to his P. 133 of the 1st Instant.

P. M. Dejour
The 8th June 1878

By order &c
Sd/- W. B. Home,
Asst. Secretary

204 3413W of 22 July 177
160W - 29 May -

12/5/77

Recd 27 July
L-3.

To acty 3-7-78 / 5-7-78

Ar 5-7-78 Rtd 8-7-78

From
The Superintendent,
Madras Harbour Works

To,
P. Dejour Esq.
Executive Eng^r, Cement Expts. Div.
Calcutta.

Madras, October 24, 1876.

I have the honor to send by the
P. and O. Steamer "Tona" a box con-
taining General Morgan's Cement
for you to test. I have been requested
to do this by the Government of Madras
vide G.O. No. 2486 dated 13th September 1876.
I shall be glad if you will apply tests
to the Cement when mixed with sand
in different proportions. As it appears
to be enabled to carry so much sand as
Portland Cement from England.

I shall be much obliged if you will
favor me with a copy of the results.

Specification.

An improved mode of rendering shell lime hydraulic.

The shell must be ground so finely, as to pass through a 50 gauge sieve then to one part by measure of moist blue clay from A in the tertiary deposit, add one part of ground shell, mix both together intimately in a water tank until of the consistence of thick cream, then dry, make into bricks and pack with layers of coke in a double truncated cone kiln about 30 feet high and an average breadth of 8 feet. To burn the bricks to clinker it is necessary to use one quarter ton of the best silvery coke to produce one ton of clinker which when burnt should be of a dark green color. The clinker should at once be ground, passed through a 50 gauge sieve and then exposed to air for 60 days, being frequently turned over when it becomes weathered and obtains a full tensile strength of 500 lbs. the square inch often being seven days in water. The light colored cement that comes from the

the kiln, may be ground and mixed with the dark in the proportion of ten per cent light to 90 per cent dark, but any cement unburnt of a pink color should be reburned. If a very strong Cement is not required, the proportion of lime to clay should be reduced, or 75 per cent by measure of lime to 100 per cent by measure of clay; but it is most economic to make the very strongest cement as the carriage then costs less. The clay used must be very pure, free from sand, stones, vegetable matter and other impurities, this Cement being made of the very purest materials, is the strongest Cement ever discovered.

Sigd H. B. Morgan Major Genl
Madras Army Retired

Number	Composition of Mortar	Age of Mortar	After what		How long	Height
			immersed	in water	immersed	supported before
781	Madras Cement Sand	1	21 days	24 hours	17 days	340
782	do do	"	do	do	do	420
783	do do	"	do	do	do	550
826	do do	" 1 month	do	do	28 days	380
827	do do	do	do	do	do	700
828	do do	do	do	do	do	800
784	Madras Cement Sand	1	15 days	do	13 days	360
785	do do	2	do	do	do	320
786	do do	"	do	do	do	380
787	do do	"	21 days	do	17 days	310
788	do do	"	do	do	do	310
789	do do	"	do	do	do	310
842	do do	" 2 months	do	do	1 month 28 days	460
843	do do	"	do	do	do	430
844	do do	"	do	do	do	450

the kiln, may be ground and mixed with the dark in the proportion of ten per cent light to 90 per cent dark, but any cement unburnt of a pink color should be reburied. If a very strong Cement is not required, the proportion of lime to clay should be reduced, or 75 per cent by measure of lime to 100 per cent by measure of clay; but it is most economical to make the very strongest cement as the carriage then costs less. The clay used must be very pure, free from sand stones, vegetable matter and other impurities, this Cement being made of the very purest materials, is the strongest Cement ever discovered.

Sig^d H. R. Morgan Major Genl
Madras Army Retired

Statement of Experiments made with Micheli's Tester

each line showing the Tensile strength of Madras Cement.

Number	Composition of Mortar	Age of Mortar	After what time it was immersed in water	How long immersed	Weight supported before breaking of 1/2 in	Breaking weight per square inch	Quantity of water used in mixing the Cement	Remarks
796	Madras Cement pure	8 Days	24 hours	6 Days	580	257 1/2 lbs	27 per 100	
797	do do	do	do	do	630	280 "	do	
798	do do	do	do	do	620	275 1/2 "	do	
799	do do	15 Days	do	13 Days	820	364 "	do	
800	do do	do	do	do	750	333 "	do	
801	do do	do	do	do	700	310 "	do	
802	do do	1 month	do	28 Days	570	253 "	do	
803	do do	do	do	do	580	257 1/2 "	do	
804	do do	do	do	do	560	253 3/4 "	do	
823	do do	do	do	do	565	253 3/4 "	do	
824	do do	do	do	do	600	266 1/2 "	do	
778	Madras Cement / Sand	15 Days	do	13 Days	460	224 1/4 "	25 per 100	
779	do do	do	do	do	450	220 "	do	
780	do do	do	do	do	480	223 "	do	

Number	Composition of Mortar	After what		How long immersed	Height of support before immersed on an anvil of 1 1/2 x	Breaking weight per square inch	Quantity of water used in mixing the Cement	Remarks
		Age of mortar	Time it was immersed in water					
781	Madras Cement 1 Sand 1	21 days	24 hours	19 days	340 lb	157 lbs	25 per cent	
782	do do	do	do	do	420	186 1/2 "	do	
783	do do	"	do	do	350	155 1/2 "	do	
826	do do	" 1 month	do	28 days	380	168 3/4 "	do	
827	do do	do	do	do	700	310 "	do	
828	do do	do	do	do	800	355 1/4 "	do	
784	Madras Cement 1 Sand 2	15 days	do	13 days	360	160 "	do	
785	do do	"	do	do	320	146 1/2 "	do	
786	do do	"	do	do	360	160 "	do	
787	do do	21 days	do	19 days	310	137 1/2 "	do	
788	do do	"	do	do	310	137 1/2 "	do	
789	do do	"	do	do	340	157 "	do	
842	do do	2 months	do	1 month & 28 days	460	204 1/4 "	do	
843	do do	"	do	do	430	191 "	do	
844	do do	"	do	do	450	200 "	do	

Number	Composition of Mortar	After what		How long immersed	Weight to support or breaking an area	Breaking weight per square inch	Quantity of water used in mixing the Cement	Remarks
		Age of Mortar	time it was immersed in water					
770	Hadras Cement sand	15 days	24 hours	13 days	300	133 Lbs	25 per cent	
771	"	"	"	"	270	120 "	"	
772	"	"	"	"	280	124 1/4 "	"	
773	"	"	21 days	17 days	300	133 "	"	
774	"	"	"	"	270	128 3/4 "	"	
775	"	"	"	"	290	128 3/4 "	"	
845	"	"	2 months	1 month & 28 days	410	182 "	"	
846	"	"	"	"	370	173 "	"	
847	"	"	"	"	420	186 1/2 "	"	

Wm. J. Bantopher Head Clerk
 For Executive Engrs.
 Cement Experiments etc.

Statement of experiments made with Micheli's machine showing the tensile strength of Major General Morgan's Patent Portland Cement.

Number	Composition of Mortar	After what age of time it was immersed in water	How long immersed	Height of support above breaking in an area of square inch	Breaking weight per square inch	Quantity of water used in mixing the cement	Remarks
725	Cement pure	18 months	24 hours	18 months	Does not break minus 24 hours @ 1000 lbs	27 per cent	This cement could not be tested higher than 1000, as my Micheli's Testing Machine does not go further, and my Adie's machine is out of order.
726	do	do	do	do	do	do	do
727	do	do	do	do	do	do	do
767	Cement sand	1	do	do	1000 lbs	44 1/2 lbs	Broken, on being left for about 2 minutes only with the full strength of 1000 lbs.
770	do	"	do	do	do	do	do
772	Cement sand	1	do	do	900 lbs	39 1/2 lbs	do
774	do	"	do	do	880	38 3/4 "	do
775	Cement sand	3	do	do	800	35 1/4 "	do
777	do	"	do	do	790	34 7/8 "	do

(Sd) P. Dejour,
Executive Engineer,
Cement Experiments &c.

B. P. Works

Public Works Department

No 2791

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Under date the 8th July 1908

Read the following:—

From

The Gov. of India (H.C. No. 148 I of 24th June/08)

Communicated to
Major General Morgan
with reference to his
letter of the 16th June
last.

2. Ordered that the
following letter be sent.

H.C. No. 2792 dated 8th July/08

To the Secretary to the Gov.
of India.

Major General Morgan

Ch. Secy. I. S.
C. Secy. I. S.
Ch. Secy. I. S.
Secy. to Gov. Madras

In acknowledgement

Recd 20-7-08 receipt of the correspondence
20-7-08

forwarded with Captain
Kipwith's dossier ²⁰⁷⁹ ~~2078~~
of the 24th June 1878, I am
directed to suggest that
the concluding paragraph
of the letter from Mr.
Dejoux, No 133 of the
31st May 1878, may be
communicated to all
the Governments and
officers to whom the
extracts forwarded
with Circular No 18
of 2nd May 1877 were
sent.

eat
5/7

Reigned Orders despatched at Delhi
on the 22-4-78.
Re. despatch at Madras with 26
copies of G.O. No 2791 & on the
24-4-78.

Copy 3-7-78

Copy 5-7-78. Recd 8-7-78

7397

Govt. of (1878) Madras.

PUBLIC WORKS.

To

Dated

Issued

Recd.

Encl.

G. O. 8th July 1878, No. ²⁷⁹¹/₂₇₉₂ W

No. 76 to

General Morgan's Cement

ordered that the Govt of
India be addressed regarding
their report on — & that
there orders be com to Genl
Morgan

Entire Rpt.

Requesting the concluding para
of Mr. Morgan's letter regarding
Genl Morgan's cement may be
com to all ~~Government~~
Government

Officers concerned