-37-

9/2/62

(1) Number of pages 74.

(2) Date of repair 10. 11. 87

(3) Initials of the Referencer

TAMIL NADU ARCHIVES

GOVERNMENT OF TAMIL NADU

P-W-D. DEPARTMENT

G.O. No. / B.P. No. 275-W. Press. / Mis.

Dated 1- 2- 1886. ~~198~~.

Not to be folded or roughly handled.

1st February 1886, No. 275 W., Public Works.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

Read—the following papers :—

From the Conservator of Forests, Northern Division,	dated	19th July 1885,	No.	786.
From the Chief Engineer, Central Provinces,	,,	21st ,, ,,	,,	5056.
From the Superintending Engineer, I Circle,	,,	19th Sept. ,,	,,	249 G.L.
From the ,, ,, ,,	,,	3rd Oct. ,,	,,	264 G.L.
From the Chief Engineer, Bengal,	,,	21st Nov. ,,	,,	1735 B.
To the Principal, Civil Engineering College, Rurki,	,,	7th Dec. ,,	,,	2077 C.
To the Chief Engineer, Bengal,	,,	7th Dec. ,,	,,	2078 C.

Summary of Opinions Recorded as to the Usefulness of Sâl Timber for Building Purposes.

T. H. Wickes, Esq., Superintending Engineer, South-Western Circle, Bengal.

Good, sound, mature sâl timber, properly seasoned and free from sapwood, is one of the best materials for roofs; and, though not exempt from dry rot or the attacks of white-ants, it is less liable to these than teak and most other timbers. The difficulty is to get good sâl timber, and the question raised seems to hinge on whether good, mature, seasoned sâl-wood is procurable on the sea-coast or not.

Major G. F. E. S. Neill, M.S.C., Superintendent of Works, Calcutta.

Sâl timber is not now used for Government buildings in Calcutta; but sâl beams have been found in old buildings, which, though attacked by white-ants and dry rot, have shown as great a power of resistance as teak timber. His experience in the mofussil is that sâl is much more subject to the attack of white-ants than teak timber.

H. Joll, Esq., Divisional Superintendent of Works, Patna.

Sâl timber of mature growth, if sound, *i.e.*, free from sapwood and cracks, well seasoned and kept dry, will last for a practically unlimited period. The failure of sâl beams invariably occurs at the end of the beams where they are built into the walls. Care should therefore be taken that the ends are properly preserved. Recommends the following treatment for the preservation of sâl beams :—

(*a*) Give the beam as full a bearing as the wall will admit of, and let the ends rest on stone slabs or tiles made of Portland cement and sand.
(*b*) Keep an air space all round the ends of the beams.
(*c*) Let the ends of the beams be cut square and clean with a saw, just before putting into the work.

(*d*) The clean ends to be then paid over with creosote forced in with sash tools to thoroughly plug up the ends of the beam, which should then be hermetically sealed with a thick coat of English glue laid on hot.

(*e*) All parts of the beams (within the wall), as well as the whole of the top of the beam, to receive three coats of silicate paint, and the internal pointing to be done after the roofing is finished and the beams quite dry.

Does not recollect ever having had to change a sâl-wood beam on account of damage done by white-ants. The destroying cause in 99 cases out of 100 is dry rot caused by want of proper treatment of the ends built into the masonry.

J. H. Wilson, Esq., C.E., Superintending Engineer, Western Circle, Bengal.

Sâl timber is useful for building purposes, and, if sapwood is carefully avoided, it is secure from the ravages of white-ants. As the ends of the beams built into the walls invariably suffer from dry rot, care should be taken to leave spaces at these parts for the free circulation of air.

W. B. Christie, Esq., Executive Engineer, Hazaribagh.

Heart of sâl timber withstands the attack of white-ants and dry rot very well, but to what extent as regards time he is unable to say.

D. F. Martin, Esq., Executive Engineer, Bhagulpore.

Sâl is a good durable timber and well adapted for use as beams, &c. It will bend considerably before giving, and does not snap like some other timbers. Sâl beams that have sagged can be turned over and used again under a lighter weight. The pith of sâl is attacked by white-ants and dry rot, but not the heart wood.

W. H. Nightingale, Esq., Superintending Engineer, Eastern Circle, Bengal.

If sâl can be obtained from good mature trees, it is the best timber that can be used for building purposes. If properly matured it is undoubtedly the best wood for withstanding white-ants and dry rot.

Major W. L. Greenstreet, R.E., Superintending Engineer, Presidency and Oudh Command, Bengal.

The great objection to sâl timber is the extreme uncertainty as to its quality and behaviour, and the great difficulty which exists in obtaining really good well seasoned wood. A great practical disadvantage resulting from the uncertainty as to the quality of sâl consists in the difficulty of knowing the condition of the timber after it has been for some years in a roof. A beam may look perfectly sound when it is absolutely hollow. Sâl wood is liable to attacks from white-ants and dry rot, and great care has to be taken to preserve it from decay. Whenever the ends of beams are built into masonry, unless great care is taken to insure the existence of an air space round them, they are sure to decay after a time. Sâl timber ought not to be used, especially in a damp climate, unless great economy results from its adoption.

The Executive Engineer, Fort William Division.

The sâl-wood beams that were used for the terraced roofs and floors of certain barracks in his division frequently require replacing. When taken down they are often found to be nothing but a mere shell, the interior being destroyed either by white-ants or by dry rot. The timber used was, however, not well seasoned. Seasoned sâl-wood is always difficult to obtain, and ordinary sâl is very subject to the attacks of white-ants; but if well seasoned, it will resist dry rot for many years.

Chief Engineer, Bengal.

In forwarding these opinions, the Chief Engineer, Bengal, observes that considerable differences of opinion exist amongst officers who have had much experience of the timber as a building material. The majority are, however, agreed that sâl timber of good quality, if due precautions are taken to protect it from decay, is a building material of great value, and in this opinion he concurs.

Chief Engineer, Central Provinces.

States that many years' experience of sâl timber enables him to say that it is an excellent material for building purposes when thoroughly matured and seasoned.

J. S. Gamble, Esq., Conservator of Forests.

Quotes an opinion recorded by Mr. Clifford that "sâl, when thoroughly seasoned, stands, almost without a rival, as a timber, for strength, elasticity, and durability, which qualities it retains without being sensibly affected for an immense length of time." States that, if the precaution be taken of securing logs which have been felled for at least five years and which are free from sapwood, hollows at the end, and signs of dry rot, sâl timber will fully bear out Mr. Clifford's opinion, and prove perfectly durable and impervious to dry rot and white-ants. At present, however, there is great difficulty in procuring seasoned timber of large size.

Captain L. Langley, R.E., Executive Engineer.

In its unseasoned state sâl-wood is liable to destruction by white-ants. Sees no reason why seasoned sâl timber should not act well both for buildings and for shutters, but, as yet, has had little experience of seasoned sâl-wood.

T. D. Harris, Esq., Executive Engineer.

Considers it very difficult to obtain seasoned sâl-wood, and, when obtained, to distinguish it from unseasoned timber. Sâl-wood is liable to warp and sag under weight more than any other wood when confined under terraces; and it does not stand the extremes of season under such circumstances. However well seasoned or protected, sâl-wood generally fails by dry rot, and then yields easily to the ravages of white-ants. As a building material sâl-wood is not superior to many species of country wood.

W. Jopp, Esq., Executive Engineer.

Sâl-wood sags a great deal, and is therefore not a suitable timber for terraced roofs. If the timber is not cleared of all sapwood, white-ants will attack it.

Note by the Chief Engineer.

In paragraph 3 of G.O., No. 1552 W., dated 3rd July 1885, the Chief Engineer was directed to institute inquiries as to the suitableness for building purposes of sâl timber, and to report the result.

2. References were accordingly made to the undermentioned officers, from whom replies have now been received:—

(1) The Chief Engineer, Bengal.
(2) The Chief Engineer, Central Provinces.
(3) The Conservator of Forests, Northern Circle.
(4) The Superintending Engineer, I Circle.

3. These opinions have been summarised in the accompanying precis, and they lead to the conclusion that, if officers will see that the sâl timber used by them for building purposes is well seasoned and free from sapwood, there will be no cause to complain of it as a building material. The Chief Engineer is of opinion that this should be impressed upon all officers of the department, and that they should be warned to take all necessary precautions for the preservation of the ends of the beams when used for roofing, &c. It is at this particular part of the beam that the ravages of white-ants and dry rot first take effect; and if proper preventatives are employed and the wood is properly seasoned, there is every reason to expect that sâl timber will be found of great value as a building material.

4. It is, however, questionable whether, looking to the increasing difficulty in procuring, at moderate cost, sound timber suited to the purpose, iron is not a cheaper as well as a better material for use in the construction of buildings.

Order—dated 1st February 1886, No. 275 W., Public Works.

Communicated to officers of the Public Works Department.

(True Extract.)

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

To Superintending Engineers.
To the Chief Engineer for Irrigation.
" Consulting Engineer for Railways.

Exd. E. Fernandez.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1886} Madras.

PUBLIC WORKS.

Dated February, 1st.

Recd. Encl.

G.O., 1st Feb. 1886, No. 275 W.

FEBRUARY.

Sal Timber

Papers on the subject of the suitableness for building purposes of —, communicated to officers of the Public Works Department.

Form No. 63. No. 786 Office of Conservator of Forests, N. D.,

Camp Gooty, 19th July 1885.

From

J. S. GAMBLE, Esq.,
Conservator of Forests,
Northern ~~Circle,~~ Division

To

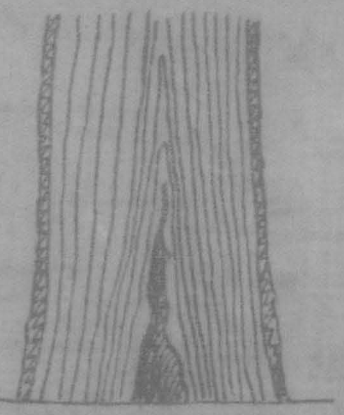
The Chief Engineer
Public Works Department.

Sir,

In reply to your No. 445 C of the 4th July I have the honor to say that the opinion of the Executive Engineer Vizagapatam in regard ~~regard~~ to the durability of Sál wood is, I think, opposed to general experience. Sál beams are the common material for supporting flat roofs in Calcutta and throughout Lower Bengal and they have I feel sure been always regarded as durable and exempt from the attacks of white ants though liable to another defect viz:- a tendency to "sag" which has caused Engineers to prefer to use iron beams instead of late years wherever possible.

2. It is very probable that Sál wood which has only been allowed one or two years to season and which may perhaps be cut from young trees, would suffer from dry-rot especially at the setting in the walls. And it is well known that white ants who invariably reject hard dry well seasoned wood speedily devour sapwood and decayed wood including of course any which

has been attacked by dry-rot. A considerable proportion of the trees cut in the Zemindari forests, from which the Vizagapatam supply comes, I presume, I feel sure are from young trees, barely 4 ft in girth bark and sapwood included. These young trees have in something like one-half the cases, a hollow at the base inside extending more or less upwards into the bole. The cause of this is that when young the trees or shoots from cut stools get burnt over year after year till at last some one stronger shoot than usual escapes with life, and growing, gradually envelops the stumps and causes a hollow filled with rotten wood to be formed. Such hollows spread often the dry rot away from them upwards as the tree gets older.


ideal section

3. The following remarks were made by Mr. Clifford (I think of the Gun Carriage Factory or of the Public Works Workshops in Calcutta but am not sure) in his "Memorandum on the timber of Bengal. Calcutta, 1862".

"The inherent qualities of Sál render it a very difficult wood to season; it warps and splits in drying, and even when thoroughly seasoned, it absorbs moisture with avidity in wet weather, increasing 1-24th in bulk, and correspondingly in weight. During the process of seasoning it dries with great rapidity on the surface, while beneath it remains as wet as when first cut, and evaporation goes on afterwards with extreme slowness. The effect of this peculiarity is to cover all the surface all over with superficial flaws from unequal shrinkage. With proper precautions, however, it can be made to dry slowly, and under these circumstances it has been found by numerous experiments that the ratio of drying is $\frac{3}{4}$ of an inch annually all round the piece of wood. Sál, when once thoroughly seasoned, stands almost without a rival, as a timber, for strength, elasticity and durability, which qualities it retains without being sensibly affected, for an immense length of time."

And my own experience in the Sál forests of Bengal* agrees with this to some extent, though I cannot think that so long a time is really necessary. At 3/4 in dryage yearly, the time that a log capable of giving a 1 ft. square beam would take to season would be 9–10 years and I suspect 4 to 5 would suffice in a dry climate under shelter. The large Nepal timber sold in the private timber yards of Calcutta and Dacca is probably wood that has been cut at least 5 years previously for it usually has the sapwood all eaten off and the dark appearance of drywood. Besides it is necessary to dry Sál in order to float it properly. Quite dry Salwood has a weight of about 55 lbs per c. ft while ordinary

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* I refer to the Bengal Sál as we have little experience yet of the Circar wood W.S.

ordinary timber of fair seasoning in log weighs about 65 and wet wood of only short seasoning probably as much as 75, so that to a merchant it is very important that the wood should get as dry as possible before transport.

4. I believe that if the precaution is taken of securing wood that has been felled for at least 5 years, and that is free from sapwood and hollows at the ends and signs of dry rot, Salwood, even on the Circar Coast, will fully bear out Mr Clifford's opinion and prove perfectly durable and impervious to dry rot and white ants. At present, seasoned large timber is very difficult to get, for the roads into the Circar hills are bad, the cattle small and weak, the carts also very weak and easily broken, and the people difficult to induce to work. The old system adopted by dealers who bought timber in the Government forests of Ganjam was to fell a big tree, take one length of 10 to 12 ft out of the middle or from the base, just of a size that their cart would carry and leave the top and branches and perhaps the base piece in the forest — And I have no doubt the same wasteful plan is still followed in the Jeypore and other forests from which the Vizagapatam supply probably comes.

I have the honor to be,
Sir,
Your most obedient Servant,
J. Sykes Gamble
Conservator of Forests,
Northern Division

Form No. 63.

1885-86.

MADRAS FOREST DEPARTMENT.

From

The Conservator of Forests,
Northern ~~Circle,~~ Division

To

The Chief Engineer
Public Works Department

Backward Reference.

No. dated

Dated 19th
Despatched 21st } July 1885.
Received

No. 786

Enclosure.

Subject.

Forwarding his opinion regarding the Characteristics of Sál wood as to its durability &c.

Forward Reference.

No. dated

PUBLIC WORKS DEPARTMENT, C. P.

No. 5056

Nagpur, 21st July 1885.

From

The CHIEF ENGINEER,
CENTRAL PROVINCES,

To

The Chief Engineer
Madras

Sir,

In reply to your No. 1146 C d/ 4th Instant, I have the honor to state that many years experience of Sál wood enables me to say that it is an excellent material for all the purposes mentioned, when the wood is thoroughly mature & seasoned.

Full information regarding the wood is contained in the Roorkee Civil Engineering Treatise.

I have the honor to be,
Sir,
Your most Obedt. Servt.,
J. H. Addison Captn. R.E.
for Chief Engineer, C. P.

Enclosures.
Nil

Incl 754

Rcd 28/8/55.

With C

Nos 2027/2028 [illegible]

Precis of the opinions expressed by the following Divisional Officers regarding the use of Salwood in Buildings

Captain Langley &c Executive Engr

Ganjam Division Officer Captain Langley states that his present experience of the use of Salwood in buildings is confined almost entirely to unseasoned wood which is commonly used in the Ganjam District. In its unseasoned state Salwood is liable to be destroyed by whiteants. The small amount of Salwood work he has put up during the last year has been seasoned wood but it has been up too short a time for any trustworthy deductions to be drawn from its appearance. He says that he sees no reason why seasoned Salwood should not act well both for building purposes and for shutters.

L. D. Harris Esqr Executive Engr

The Vizagapatam Division Officer Mr Harris states that it is really

very

very difficult to get well seasoned Salwood and also very difficult to distinguish it from the unseasoned the color, weight and in fact every thing else being almost the same and no difference perceptible - As a general rule Salwood is liable to warp and sag under weight more than any other wood when confined under terrace, and it does not stand the extremes of seasons under such circumstances - Near the Sea Cost as well as in the interior it fails generally by dry rot, and then yields very easily to the ravages of white ants however thoroughly seasoned and protected; and though easy for work except its weight and presenting a smooth surface and capable of polish, as timber for building purposes it is not superior to many of the species of Country wood that are used in buildings; in fact the natives seldom use it; so far he writes this from

from immense experience - He further says that in Ganjam the terraced roofs of all the Jail Buildings at Berhampore had to be changed as they were put upon Salwood joists which gave way in an extraordinary manner in their setting in the walls and in fact all over - The terrace roof of the Church at Berhampore was sliding off the Sal joists and he had to put on tiles for the sloped terrace - In Vizagapatam the roofs of the Lunatic Asylum buildings at Waltair have failed for the very same reasons. Salwood stands well in water but its constant tendency to warp and sag with the extremes of seasons year after year unsuits it absolutely for terrace buildings -

W. Jopp Esqre.
Executive Engr.

Mr Jopp Executive Engineer now employed in the Godavari Central Division says that from his experience in Ganjam Division Salwood sags a good deal and thus

thus not a very suitable timber for terraced roofs. If the timber is not cleared of all sapwood white-ants will attack it.

Wm Mathew Asst Engr

For Superintending Engineer 1st Circle

No. 2499 L

9-A

From,

The Supdg Engineer
1st Circle.

To,

The Chief Engineer
P.W. Department.

Enclosure one

Dowlaishwaram 19th Septr 1885

Sir,

With reference to para 3 of P.M.G. No. 1552 W. dated 3d July 1885 P.W.D. & your letter No. 1144 C. dated 4th idem relative to the subject of the use of Salwoo in buildings in the Northern Districts I have the honor to forward to you a precis of the opinions of the Officers marginally noted who have had some experience of its use.

Capt. Langley R.E.
J. D. Harris Esqr.
W. Jopp Esqr.

2. All these Officers would appear to be of opinion that Sâl when "unseasoned" or "not cleared of sapwood" is liable to be destroyed by white ants, and both Mr. Jopp and Mr. Harris consider it unsuitable to be used in roofs on account of its tendency to sag.

3. The opinion expressed in my letter No. $\frac{C}{77}$ dated 4th June 1885 printed with the Government Order above referred to was based on the examples then before

me viz the buildings of the Lunatic Asylum at Waltair which were completed in 1871.

I have the honor to be,
Sir,
your most obedient St.

W. J. Matthews Asst. Engr.
For Supt. Engr. 1st Circle.

T.K.

8413

From
The Suptg Engineer
1st Circle
To
The Chief Engineer
P.W. Deptt
Madras

No. 2019/2078 [illegible]

Dated 19th } September/85
Despd 19th }
Rec 28

No. 2499 L
Enclo one

Salwood. use of — in buildings in the Northern Districts
Report on the —

Compile
FB

.2646. L.

Vide No. [illegible]
7.12.85

There appears to be a considerable difference of opinion regarding the durability of Sâl wood. The majority consider that if of good quality & if due precautions are taken to protect it from decay, it is a building material of great value and this opinion is endorsed by the Chief Engr Bengal. The Chief Commr Central Provinces seems also to be of the same opinion.

The difficulty appears to be to recognise really good wood, and it appears from paras 2 3 4 of Major [illegible] letter No 5086 dated 7th Oct/85 that even experienced men may be deceived

2644. L.

The seasoning of sâl wood seems to be a matter of difficulty as is shown in para 3 of letter No 786 dated 19th Aug /85 from the Conservator of Forests Northern Division.

The Madras officers who have given their opinions are opposed to the use of sâl wood.

From a perusal of all the papers, it would appear that sâl wood is uncertain in quality & that it is almost impossible to tell whether it is good or bad seasoned or unseasoned, and this being the case it seems doubtful if it should be used for building except in exceptional cases.

2/12/85

12

To
The Supt. Record
dept. P. W. Dept.

Sir

The book you
ask for is not
in the B. S. Library

Yours faithfully
J. Hamilton
Librarian
B. S. Library

3-12-88

Can.

No 37 of the Roorkee Professional papers contains the Article required by W. as we had not the book in our Library I applied to the R.E. Library for it & from the reply on the other side you will see that the R.E. Library does not contain it either. — J.P.

3-12-85 —

.2646.L.

Note. ~~14~~

In the papers record-
in G.O. No: 1552 W.
3 July '85, the S.E. I.R.
nd the E.E. Vizag-
patam Division are
commended Sâl timber
s a building material.
he Govt were not p-
ared to accept the
ondemnation without
urther enquiry, and
he Chief Engineer
ccordingly addressed
he Chief Engineers,
Bengal and Central
Provinces, the Conservator
f Forests, Northern Circle,
nd the Supg Engr I.R.
n the subject.-

Their replies have
been received and are
submitted with this
note.-

The Chief Engineer
Bengal, has kindly

forwarded copies of
reports on the subjec
made to him by offic
the Bengal P.W. D.
The Chief Engineer ad
the opinion of the major
that sâl wood of goo
quality - if due precaut
are taken to protect i
from decay - is a
building material of
great value.

A draft letter to
the Ch: Engr: Bengal
acknowledging with
thanks his letter and
enclosure is put up.

Submitted for
orders.

HB-

2/12/85.

In accordance with
para 3 of G.O. 1552 w

15

o. 2646. L.

NG ENGINEER

FIRST CIRCLE

8 3 July 85, the result
of the Enquiries made
is to be reported by
the Ch. Engr. to Govt.

HB.

No. 264 G.L.

FROM,

THE SUPERINTENDING ENGINEER
FIRST CIRCLE.

Enclosure [illegible]

TO,

THE CHIEF ENGINEER
P. W. Department
FOR IRRIGATION

DOWLAISHWARAM, 3rd October 1885.

SIR,

In continuation of this Office letter No. 249 G.L. dated the 17 September 1885 I have the honor to submit herewith for your information copy of a ×report received from the Supervisor in charge Rajahmundry Subdivision on the subject of the use of Sabwood in buildings.

×dated the 28 August/85

I have the honor to be,
Sir,
your most obedient St.

Asst. Engr.
For Supt. Engr. 1st Circle

JK

Sir,

I have had two years' experience in the use of Salwood, in Ganjam District, about the year 1876, and I invariably found it more yeilding & less durable than Teakwood. Salwood is of closer grain than Teakwood, and heavier. The sap of Salwood is thicker and it takes several years to dry so much so, that in extending the Hill Jail at Russekonda, I happenned to remove from the old building, a piece of Salwood 12" × 10" scantling of 20 years standing and never exposed; and on cutting it, I found the heart of it quite sticky, as is generally the case in case of fresh and unseasoned wood.

The defects of Sal-wood are:-

(1) It sags more under comparatively less weight.
(2) It is less proof against climatic changes than Teak wood.
(3) It is completely at the mercy of whiteants.

(Signed) N. VirRagaviah
Sub Dl. Officer.
28-8-85.

(True Copy)

Asst. Engr.
For Supd. Engr. 1st Circle.

JK

[illegible] 8844

FROM,

THE SUPERINTENDING ENGINEER

FIRST CIRCLE.

TO,

THE CHIEF ENGINEER

~~FOR IRRIGATION.~~

PW Departt

DATED 3rd
DESPATCHED 3rd Octr 1885.
RECEIVED (6)

No. 2649.L

ENCLOSURES. one.

Salwood - use of -
in buildings in the
Northern District
Reports further on

Compile

FB

20/11

1735B 21st Novr 5.

19

No. 3520, dated Calcutta, the 7th August 1885.

From—T. H. Wickes, Esq., Superintending Engineer, South-Western Circle,
To—The Chief Engineer, Bengal.

In reply to your No. 1336B of the 3rd instant, regarding the durability of sâl and its power of resistance to the attacks of white-ants and dry rot, I have the honour to state that I have found good, sound, mature sâl wood, properly seasoned and free from sap wood, to be one of the best descriptions of timber for roofs, and, though not exempt from dry rot or the attacks of white-ants, to be less liable to these than teak and most other timbers.

2. The difficulty is to get such wood. Twenty years ago it used to come down from the Nepal jungles, but now it never does so, and the sâl wood at present procurable in Bengal has a great deal of sap wood about it, which quickly decays and is rapidly attacked by white-ants. Whilst good sâl is one of the best timbers obtainable, indifferent sâl is one of the *very worst*, and the answer to the question raised by the Chief Engineer of Madras seems to me to hinge on whether good, mature, seasoned sâl wood is procurable on the sea coast or not. 1.

No. 3563, dated Calcutta, the 7th August 1885.

From—Major G. F. E. S. Neill, m.s.c., Superintendent of Works, Calcutta,
To—The Chief Engineer, Bengal.

I have the honour to acknowledge the receipt of your letter No. 1336B, dated 3rd instant, requesting an expression of my opinion on the durability of sâl wood and its power of resistance to white-ants and dry rot.

2. This description of timber is never used now in Government buildings in Calcutta, but sâl beams have been come across in dismantling old buildings which, though attacked both by white-ants and dry rot, have shown as great power of resistance as teak timber. 2.

3. My experience in the mofussil, however, is that sâl is much more subject to the attack of white-ants than teak timber.

No. 593G, dated Bankipore, the 22nd August 1885.

From—H. Joll, Esq., Divisional Superintendent of Works, Patna Division,
To—The Chief Engineer, Bengal.

In reply to your No. 1336B, and enclosure, dated 3rd instant, calling for an expression of opinion as to the durability of sâl wood and its power of resistance to the attacks of white-ants and dry rot.

2. I believe that sâl timber of mature growth, if sound, *i.e.* free from sap wood and cracks, well seasoned and kept dry, will last for a practically unlimited period of time.

3. Many of the sâl wood beams and architraves in Government House, Calcutta, are in all probability the same as were originally put in in 1801. I speak under correction as to the exact date. About 10 years ago I had occasion to change some of the architrave beams. It was very ticklish work and had to be done under the closest supervision, and judging from the *brickwork* which had to be dismantled to effect the change of beams, I should most decidedly say that the beams we then changed were the ones put in when the house was originally built. The reason of the beams requiring to be changed was on account of their having been much affected with dry rot.

4. *As regards sâl timber exposed to weather.*—The timber viaducts we have been recently constructing in Behar, I have estimated that, if called upon to do so, I should guarantee their life for 30 years. Judging from examples of existing structure which I have inspected and ascertained to have been over 30 years in existence, I should think the new ones will be good for over 40 years, so that the suppositional guaranteed life should be well within the powers of endurance of sâl timber exposed to weather. 3.

5. *Cause of decay in sâl beams.*—In nearly all cases of the many hundreds, or perhaps thousands, of sâl beams which have come under my notice—I allude now particularly to beams for flat terraced roofs—the failure invariably occurs at the end of the beams where they are built into the walls. The ends of the beams were closely surrounded with green masonry and without any paint or other preservative agency being employed. Various attempts have been made to improve upon this method of setting the ends of beams—

- (*a*) The ends have been lined with sheet copper or zinc.
- (*b*) Hollow spaces have been left in the masonry to allow for a free passage of air all round the end of the beams.
- (*c*) The ends have been coated with coal tar.

6. The plan of sheathing with copper did not, as far as I could judge, produce any very good result in the absence of any preservative composition having been first paid over the ends of the beams.

Coal-tarring appears to have a very good effect, but it has the disadvantage of discolouring the beams beyond the edge of the wall unless very carefully applied.

5.4

copy this

7. The treatment I would recommend for the preservation of sâl beams is as follows:—

- *a.* Give the beam as full a bearing as the wall will admit of, and let the ends rest on stone slabs or tiles made of Portland cement and sand.
- *b.* Keep an air space all round the ends of the beams.
- *c.* Let the ends of the beams be cut square and clean with a saw just before putting into the work.
- *d.* The cleaned ends to be then paid over with creosote forced in with sash tools to thoroughly plug up the ends of the beam, which should then be hermetically sealed with a thick coat of English glue laid on hot.
- *e.* All parts of the beams (within the wall) as well as the whole of the top of the beam to receive three coats of silicate paint and the internal painting to be done after the roofing is finished and the beams quite dry.

8. A sound sâl wood beam treated as above will last, as before stated, for a practically unlimited period of time.

9. *White-ants.*—These will attack sap wood, especially in dark and damp godowns and such places, but they will rarely be seen in light and well-ventilated rooms, or if they do appear, their effects will be found to be of merely surface depth. I do not recollect ever having had to change a sâl wood beam on account of damage done by white-ants.

Dry rot has almost always been the destroying cause, and in 99 cases out of a 100 it has been from want of proper treatment of the ends built into the masonry. The most curious case that ever fell within my experience was a verandah beam from the Military Secretary's bungalow in the Barrackpore Park, which was found on removal to be a "mere carcase of paint."

10. I regret the delay in replying to your letter, due to an extended tour through the Sarun district, and shall feel obliged, if any suggestions for the preservation of sal-timber should be given by any of your men, if you will favour me with a copy of them.

No. 2255, dated Dinapore, the 5th September 1885.

From—J. H. Wilson, Esq., c.e., Superintending Engineer, Western Circle,
To—The Chief Engineer, Bengal.

I have the honour to acknowledge the receipt of your No. 1336B., dated 3rd ultimo with its enclosure, from the Government of Madras.

2. On its receipt the above was circulated to the Executive Engineers in the Western Circle, and I herewith annex their replies.*

4

3. But before answering your letter I had again to address the Executive Engineer, Hazaribagh, with reference to the sâl wood beams in the Puruliah court-house, some 10 or 12 of which on inspection, two years ago, were found to have suffered from dry rot at their ends, where close built into the masonry of the walls. These beams, the Executive Engineer now informs me, were put up in the year 1870, that is, 13 years ago.

4. This example indicates that if sâl wood beams are used, care should be taken to have air spaces at their ends in walls for the free circulation of air. In my own experience I remember, when in Oudh in 1866, that I was called on to re-roof a garden palace at a place called Chinhut near Lucknow, which had been built, so I was then informed, about 20 years previously by the Nawab of Oudh. I found that the sâl wood beams were in perfect condition between the walls, but that in the walls their ends had completely perished from dry rot.

5. As far as immunity from the attacks of white-ants is concerned, I am of opinion that this description of timber (if sap wood is carefully avoided) is safe from their ravages. On the whole, I believe, sâl wood to be a useful building timber.

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* Executive Engineer, Hazaribagh Division's, No. 2124 of 8th August 1885.
Executive Engineer, Patna Division's, No. 1963 of 10th August 1885.
Executive Engineer, Bhagulpore Division's, No. 1751 of 11th August 1885.

5

No. 2124, dated Hazaribagh, the 8th August 1885.

From—W. B. Christie, Esq., Executive Engineer, Hazaribagh Division,
To—The Superintending Engineer, Western Circle.

His No. 1893, *dated 5th August* 1885.

Executive Engineer begs to report that he has found that heart of sâl withstands the attacks of white-ants and dry rot very well, but to what extent as regards time he is unable to state.

6

No. 1751, dated Bhagulpore, the 11th August 1885.

From—D. F. Martin, Esq., Executive Engineer, Bhagulpore Division,
To—The Superintending Engineer, Western Circle.

In reply to your No. 1892 of 5th instant, I have the honour to report that I have found good sâl a durable wood and very well adapted for use as beams, &c., for supporting weights.

A sâl beam will bend a lot before giving; it does not snap like some other timbers.

Sâl timbers that have sagged can be turned over and used again under a lighter weight.

The pith of sâl is attacked by white-ants, but my experience shows they never touch the heart wood. The pith of the wood also suffers dry rot.

No. 3068, dated Calcutta, the 2nd October 1885.

7.

From—W. H. Nightingale, Esq., Offg. Superintending Engineer, Eastern Circle,
To—The Chief Engineer, Bengal.

In reply to your No. 1336B of the 3rd August last, I have the honour to report that, if sâl timber can be obtained from good mature trees, it is undoubtedly the best wood to withstand white-ants and dry rot. It has not been used in Calcutta for some 15 years, as the forests within easy reach have been denuded of all old timber, and the wood now obtainable is from young trees and is not worth using. I have had several times to dismantle roofs at Writers' Buildings and Government House, and the sâl beams which had been in for 40 or 50 years were in first-rate condition, and I hear there are beams now in native houses, which have been in for over 100 years, and are in good order. I do not know what other kinds of timber are available in the Madras Presidency, but if sâl can be obtained from good matured trees, I have no hesitation in recommending it as the best that can be used.

No. 5086, dated Lucknow, the 7th October 1885.

From—Major W. L. Greenstreet, r.e., Superintending Engineer, Presidency and Oudh Command, Military Works,
To—The Chief Engineer, Bengal.

I have the honour to apologise for the delay in replying to your No. 1337B of 3rd August 1885, about the durability of sâl timber; but I have been awaiting replies to certain queries which I put the Executive Engineers of this command about the age of the sâl timber in their divisions.

2. In my opinion the great objection to sâl timber is the extreme uncertainty as to its quality and behaviour, and the great difficulty which exists in obtaining really good, well-seasoned timber.

3. I may mention, as an example of what I mean, that some years ago, being desirous of obtaining some really good sâl wood for a particular purpose, I went to the Byramghat depôt of the Forest Department to select a few really good scantlings of large size, and I arranged that the Forest Department should be directed by Government to supply me with the best timber they could, and I was accordingly aided in making a selection by the experienced native subordinate in charge of the forest depôt.

8.

4. I selected about half a dozen partially squared logs, which seemed, both from their sound when tapped, and from their appearance, to be perfectly sound. I had them taken to Lucknow, where they were examined by an experienced subordinate, who pronounced them the best lot of logs he had ever seen; and yet when they were cut up they were all of them partially hollow and rotten inside.

5. I mention this in order to show the extreme difficulty which exists in knowing the quality of the timber which is being used, and it is on this account that the history of the timber when used in a building is very varied.

6. Thus the Executive Engineer, Barrackpore Division, writes: "The Outram Institute, late Bengal Artillery Mess-house at Dum-Dum, is roofed with sâl timber; this timber is in large scantlings and lengths* and has stood the damp climate of Bengal exceedingly well, in fact ever since the house was built in 1829."

7. On the other hand the Garrison Engineer, Fort William, reports about the sâl timber in the barracks in the Fort:—"I should say that perhaps one-half of the beams have in all been renewed since the barracks were built; the beams when taken down are frequently found to be nothing but a mere shell, the interior being destroyed either by white-ants or by dry rot."

I append a copy of this officer's letter on the subject, No. 592 of 21st August 1885, as it gives his experience of the sâl timber in the Fort William Barracks.

8. Again, a private house was recently dismantled by this Department at Lucknow. It was 40 years old, and from the roof there were taken out sâl beams 25′ × 12″ × 12,″ some of which were in very bad state, rotten and ant eaten, whilst some were in an excellent condition; but in all the ends which had been buried in the walls were gone from the effect of rot and white-ants.

9. As regards the specific questions of the Chief Engineer, Madras, as to the liability of sâl to the ravages of white-ants and dry rot, I should say that it is certainly subject to both kinds of injury.

10. Whenever the ends of beams are built into masonry, unless great care is taken to ensure the existence of an air space round them, my experience is that they are sure to decay after a time.

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* In four of the large rooms the timbers are 24 feet long 11″ × 8″ distance apart, 3′6″ centre to centre, roof two layers of tiles over burgahs, 4″ terrace.

I have seen this to be the case in numbers of instances, and it is consequently the usual practice in the Military Works Department to keep the wood out of the walls as much as possible by the use of corbel tables, iron brackets, and the like.

11. As regards white-ants, of course it is well known that they will remove any sapwood there may be in a sâl beam in a very short time, but I think it is commonly supposed that they cannot do much else: this I believe to be a mistake. It is by no means an uncommon thing to see a beam that has been removed from a roof with the whole of the softer parts of the wood eaten out of it, and nothing left but a sort of skeleton, consisting of the hard fibrous parts of the wood, and sometimes nothing is left but the outside faces of the beam, which looks like a kind of box-girder, but in this case the ants have probably been assisted by dry rot.

12. A great practical disadvantage resulting from this uncertainty as to the quality of sâl consists in the difficulty of knowing the condition of the timber after it has been for some years in a roof.

A beam may look perfectly sound when it is absolutely hollow, or *vice versâ*; it may appear cracked and bad when it is fit to remain in position for years.

13. Last winter at Allahabad I was asked to sanction the removal of certain decayed timbers in a double-storied barrack. I examined them and thought their removal unnecessary, but directed that the worst one, which was badly cracked, partly ant eaten, and much sagged, should be removed and tested.

This was done; the timber ($8\frac{3}{4}'' \times 5\frac{3}{4}''$) was placed between supports and loaded at the centre till it broke. The result showed that, when in the roof, it had a co-efficient of safety of about 10.

14. In conclusion, I should say that sâl wood ought not to be used (especially in a damp climate where there are numerous white-ants) unless great economy results from its adoption.

In Fort William we invariably use teak in preference to sâl, and now, when iron is cheap, we use iron beams in preference to either.

15. It is found that at Calcutta a rolled iron beam is actually cheaper than a teak beam in the same position (a factor of safety of 10 being allowed for the teak), and consequently rotten wooden beams are being replaced at Fort William by rolled T-iron joists.

It seems probable that the conditions along the sea-coast of Madras must be somewhat similar to those prevailing in Calcutta.

Copy of a letter No. 592, of 21st August 1885, from the Executive Engineer, Fort William Division, Military Works, to the Superintending Engineer, Presidency and Oudh Command, Military Works.

WITH reference to your circular No. 85, of 14th August 1885, asking for particulars about the life of sâl timber in buildings and its resistance to white-ants and dry rot, I have the honour to state that the information available in this division is not sufficient to enable me to give a satisfactory reply.

2. The roofs (*i.e.* the pent-roof portions) of the Dalhousie and Queen's Barrack have timber of sâl wood; most of these appear to be the original timbers put up in 1859, but several of them now show signs of decay.

9-

3. Many of the beams supporting terraced roofs and floors in these two barracks also appear to be the original beams which were all of sâl wood; every year a number of these beams have to be changed; I should say that perhaps one-half of the beams have in all been renewed since the barracks were built. The beams when taken down are frequently found to be nothing but a mere shell, the interior being destroyed either by white-ants or by dry rot

4. I am informed that the timber used in these barracks was by no means well seasoned; seasoned sâl wood could not at that time be procured, and is indeed always difficult to obtain.

5. There are in this division several much older buildings in which sâl wood timbers are to be found; there are, however, no records to show when these beams were put in. I understand that for the last 10 or 15 years very little else but teak timber has been used in the Fort William Division.

6. My own experience, and that of the most experienced assistants and subordinates in this division, is that sâl is very subject to the attack of white-ants; I have frequently in other divisions seen sâl wood work completely destroyed by those insects. As regards dry rot, I think that, if the wood is well seasoned, it will resist dry rot for many years; but, as before remarked, seasoned sâl is very hard to get, because the wood takes a long time to season properly.

deS.—Reg. No. 9381C—29—19-11-85.

No. 1735B.

CHIEF ENGINEER BENGAL.

PUBLIC WORKS DEPARTMENT.

Civil Buildings.

TO THE CHIEF ENGINEER, MADRAS, PUBLIC WORKS DEPARTMENT.

Dated Calcutta, the 21st November 1885.

SIR,

I HAVE the honour to acknowledge the receipt of your letter No. 1146C, of the 4th July last, asking to be furnished with an expression of opinions as to the durability of sâl wood and its power of resistance to the attacks of white ants and to dry-rot, obtained from officers of the Public Works Department in Bengal who have had practical experience of it as a building material, to enable you to decide on a disputed point in the Madras Presidency, viz. the suitability of such timber for terraced roofs in the moist climate along the sea coast.

2. In reply, I have the honour to transmit the accompanying printed copies of the reports which have been received on the subject from the officers who were consulted.

3. These reports show that considerable differences of opinion exist amongst officers who have had much experience of the timber as a building material. The majority are, however, agreed that sâl wood of good quality, if due precautions are taken to protect it from decay, is a building material of great value, and this opinion the Chief Engineer, Bengal, endorses.

4. In Bengal the practice of using iron rolled beams in place of timber, is, however, now almost universal in the case of public buildings. In some districts the first cost of roofs constructed with iron beams supporting jack arches does not exceed that of the ordinary terraced roofs, with beams of teak or sâl, and even in districts where the cost of the former description of roof is the greater, the saving effected by its adoption in the cost of repairs, fully compensates for the increased expenditure on the original construction. Iron rolled joists are now imported in large quantities and at low rates, and their use in buildings gives general satisfaction.

I have the honour to be,

SIR,

Your most obedient servant.

Assistant Chief Engineer.

5 S.C.

S. H. LeF.—Reg. No. 10377C—5—23-11-85.

Mch 10290

1885.

GOVERNMENT OF BENGAL.

PUBLIC WORKS DEPARTMENT.

Civil Buildings.

To the CHIEF ENGINEER, MADRAS,
P. W. DEPT.

No. 1735B.

Dated the 21st November 1885.

23 NOV 85

With other copies

No. 2077 Copy 7-12-85
2078

This should be acknowledged with thanks.

TRANSMITS opinions of Public Works officers in Bengal as to the durability of sál wood and its resisting power to attacks of white ants and to dry rot.

No. 2077 Copy 7th Decr /85 - 2d

To

The Principal,
Thomason Civil
Engg. College,
~~Roorkee~~
Rurki

Sir,

I have the honor to request you will be good enough to favor me with a copy of No. 32 (second series) of the Professional papers containing a report on experiments made at Lucknow on strength of Sal & teak timber

My office copy of the volume has been mislaid

Despatched
7/12/85

5.12.85

Cu

No 2076 Cal 7th Dec/85 93

To The Chief Engineer.
Bengal
Public Works Dept.

Sir,

I have the honor to acknowledge with thanks the receipt of your No: 1735 B. dated 21st Nov/85, and Enclosure containing the opinions of certain officers of your dept. on the suitableness of sâl wood as a building material.

W
7.12.85
Despd
7/12/85

2. I am glad to learn that you are able to endorse the opinion of the

majority that
sâl wood of good
quality is a
building material
of great value - if
precautions are
taken to protect
it from decay.

2/14/85

No. 1146 Ca/4-7-85

No. 2077/2078 Ca/7-12-85

A brief summary ma[illegible] be prepared of all the op[illegible] which have been collected on the subject of Sāl timber. — And a Note on the subject drawn up for submission to Govt. with advertence to para 3 of G. O. dated 3-7-85 No. 1552 W.

6-1-86

Please have these papers divided, as suggested into a summary of opinions received, and [illegible] by [illegible]

I should like the precis of opinions to be carefully gone thro' once more the work has not been properly done.

The name of each officer [illegible] opinion is given should be entered [illegible]

W/ Revised draft submitted
DB.

No. 1146 Ca/14-7-85

Summary of opinions recorded as to the usefulness of sâl timber for building purposes.

J. H. Wickes Esqre
Supdg. Engineer
South Western Circle
Bengal.

Good, sound mature sâl timber, properly seasoned and free from sap wood, is one of the best materials for roofs; and though not exempt from dry rot or the attacks of white ants, it is less liable to these than teak and most other timbers. The difficulty is to get good sâl timber and the question raised by the Chief Engineer, Madras, seems to hinge on whether good mature seasoned sâl wood is procurable on the sea-coast or not.

9/12

Sál timber is not now used for Government buildings in Calcutta, but sál beams have been found in old buildings, which though attacked by white ants and dry rot, have shown as great a power of resistance as teak timber. His experience in the Mofussil is that sál is much more subject to the attack of white ants than teak timber.

Major G. F. L. Neill, M.S.C.
Supdt of Works
Calcutta

Sál timber of mature growth, if sound, i.e. free from sap wood and cracks, well seasoned and kept dry, will last for a practically unlimited period. The failure of sál beams invariably occurs at the end of the beams where they are built into the walls. Care should therefore be taken that the ends are properly preserved. Recommends the following treatment for the preservation of sál beams:—

A. Joll Esqre
Divisional Supdt
of Works, Patna.

(a) Give the beam as full a bearing as the wall will admit of, and let the ends rest on stone slabs or tiles made of Portland cement and sand.

(b) Keep an air space round the ends of the beams.

(c) Let the ends of the beams be cut square and clean with a saw, just before putting into the walls.

(d) The clean ends to be then paid over with creosote first in with sash tools to thoroughly plug up the ends of the beams, which should then be hermetically sealed with a thick coat of English glue laid on hot.

(E) All parts of the beams, (within the wall,) as well as the whole of the top of the beam, to receive three coats of silicate paint, and the internal painting to be done after the roofing is finished and the beams quite dry.

Does not recollect ever having had to change a sál wood beam on account of damage done by white ants. The destroying cause in 99 cases out of 100 is dry rot caused by want of proper treatment of the ends built into the masonry.

Do

Do

J.H. Wilson Esqre C.E. Supdg. Engineer Western Circle, Bengal	Sál timber is useful for building purposes, and if sapwood is carefully avoided it is secure from the ravages of white ants. As the ends of the beams built into the walls invariably suffer from dry rot, care should be taken to leave spaces at these parts for the free circulation of air.
W. B. Christie Esqre Ex: Engineer Hazaribagh	Heart of sál timber withstands the attack of white ants and dry rot very well, but to what

extent as regards time he is unable to say.

J. F. Martin
Executive Engine
Bhagulpore

Sál is a good durable timber and well adapted for use as beams, &ca. It will bend considerably before giving, and does not snap like some other timbers. Sál beams that have sagged can be turned over and used again under a lighter weight. The pith of sál is attacked by white ants and dry rot, but not the heart wood.

W. H. Nightingale Esqre,
Supdg Engineer
Eastern Circle Bengal.

If sál can be obtained from good mature trees, it is the best timber that can be used for building purposes. If properly matured it is undoubtedly the best wood for withstanding white ants and dry rot.

Major W. L. Greenstreet, R.E.
Supdg Engineer,
Presidency & Oudh Command, Bengal.

The great objection to sál timber is the extreme uncertainty as to its quality and behaviour, and the great difficulty which exists in obtaining really good well seasoned sál wood. A great practical disadvantage resulting from the uncertainty as to the quality of sál consists in the difficulty of knowing the condition of the timber after it has been for some years in a roof. A beam may look perfectly sound when it is absolutely hollow. Sál wood is liable to attacks from white ants and dry rot, and great care has to be taken to preserve it from decay. Whenever the ends of beams are built into masonry, unless great care is taken to insure the existence of an air space round them, they are sure to decay after a time. Sál timber ought not to be used, especially in a damp climate, unless great economy results from its adoption.

The Executive Engineer
Fort William Division

The sál wood beams that were used for the terraced roofs and floors of certain barracks in his Division frequently require replacing. When taken down they are often found to be nothing but a mere shell, the interior being destroyed either by white ants or by dry rot. The timber used was however not well seasoned. Seasoned sál wood is always difficult to obtain, and ordinary sál is very subject to the attacks of white ants; but if well seasoned it will resist dry rot for many years.

Chief Engineer Bengal.

In forwarding these opinions the Chief Engineer, Bengal, observes that considerable differences of opinion exist amongst officers who have had much experience of the timber as a building material. The majority are however agreed that sál timber of good quality, if due precautions are taken to protect it from decay, is a building material of great value, and in this opinion he concurs.

Chief Engineer Central Provinces

States that many years' experience of sál timber enables him to say that it is an excellent material for building purposes when thoroughly matured and seasoned.

J. S. Gamble Esqre. Conservator of Forests

Quotes an opinion recorded by Mr Clifford that "Sál, "when thoroughly seasoned, stands almost "without a rival, as a timber, for "strength, elasticity, and durability, "which qualities it retains without being "sensibly affected for an immense length "of time." States that, if the precaution be taken of securing logs which have been felled for at least five years and which are free from sapwood, hollows at the ends, and signs of dry rot, sál timber will fully bear out Mr. Clifford's opinion, and prove perfectly durable and impervious to dry rot and white ants. At present, however, there is great difficulty in procuring seasoned timber of large size.

Capt. L. Langley R.E.
Executive Engineer

In its unseasoned state sálwood is liable to destruction by white ants. Sees no reason why seasoned sál timber should not act well both for buildings and for shutters, but as yet, has had little experience of seasoned sálwood.

T. D. Harris Esqre
Executive Engr.

Considers it very difficult to obtain seasoned sálwood, and

when obtained, to distinguish it from unseasoned timber. Sálwood is liable to warp and sag under weight more than any other wood when confined under terraces, and it does not stand the extremes of season under such circumstances. However well seasoned or protected, sálwood generally fails by dry rot, and then yields easily to the ravages of white ants. As a building material, sálwood is not superior to many species of country wood.

W. Jopp Esqre
Executive Engineer

Sálwood sags a great deal, and is therefore not a suitable timber for terraced roofs. If the timber is not cleared of all sapwood, white ants will attack it. —

H.B.

P. W. D.

33

Note by the Chief Engineer

In para 3 of G.O. No. 1552W d/3d July 1885, the Chief Engineer was directed to institute inquiries as to the suitableness ~~suitability~~ for building purposes of sál timber, and to report the result.

2. References were accordingly made to the undermentioned officers,

from whom replies
have now been received:-

(1) The Chief Engr. Bengal
(2) The Chief Engr. Central Provs.
(3.) The Conservator of Forests
Northern Circle.
(4) The Supdg. Engr. I Circle.

These opinions have been summarised in the accompanying precis, and they lead to the conclusion that, if officers will see that the sál timber used by them for

building purposes is well seasoned and free from sapwood, there will be no cause to complain of it as a building material. The Chief Engineer is of opinion that this should be impressed upon all officers of the Dept., and that they should be warned to take all necessary precautions for the preservation of the ends of the beams when used for roofing, &c. It is at this particular part of the beam that the ravages of white ants and dry rot first take effect; and if proper preventatives are employed and the wood is properly seasoned, there is every reason to expect that sál timber will be found of great value as a building material.

35

It is however questionable, whether, looking to the increasing di[illegible], in procuring, at moderate cost, sound timber suited to the purpose, iron is not a cheaper, as well as a better material for use in the construction of buildings.

W.S.
22-1-56

E.W.

HB

No. 275 W

PUBLIC, WORKS DEPARTMENT.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

UNDER date the February 1st 1886

READ the following

From the Conservator of Forests, Northern Dn.	H. E.	No. 786	dated 19th July 1885.
From the Chief Engr:, Central Provinces,	„	„ 5056	„ 21st — „ —
From the Supdg: Engr:, I Circle,	„	„ 249 G.L.	„ 19th September 1885.
Do — Do — Do —	„	„ 264 G.L.	„ 3rd October 1885.
From the Chief Engineer, Bengal,	„	„ 1735 B.	„ 21st November 1885.
Letter to the Principal, C. E. College, Rurki,	„	„ 2077 C.	„ 7th December 1885.
Letter to the Chief Engineer, Bengal,	„	„ 2078 C.	„ 7th — „ —

Summary of opinions recorded &c.

Note by the Chief Engineer, P. W. Dept. ~~H. E. No.~~ d/ 22.1.86

13

Communicated to officers of the Public Works Department.

22.1.86

ecc 30/1

Dc 12/1/86

To

Supdg: Engineers

C. E. for I

C. E. for Rys:

Govt. of 1888 Madras.

PUBLIC WORKS.

Dated

Recd. Encl.

G.O., 1 Feb 1888, No. 275

Sâl Timber

=

Papers with respect to the suitableness for building purposes of —, and repairs of the [illegible]

180
10