

(1) Number of pages _____

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MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No. 561-62 (W) Press
Mis.

Dated 19-2-1877.

Not to be folded or roughly handled

No. 467. Read the following Circular from the Government of India, Public Works Department, (Account-General,) dated Simla, 26th October 1876, No. 70 :—

Read again :—

Public Works Department Resolution Nos. 619—38 A—G, dated 20th July 1876.

Read also the following :—

Letter from Secretary to Government, North-Western Provinces, No. 335, dated 6th September 1876.

Letter from Secretary to Chief Commissioner, British Burmah, No. 3,856, dated 7th September 1876.

Letter from Secretary to Government, Punjab, No. 4,300, dated 23rd September 1876.

„ from „ „ „ „ 4,240 A, „ 14th „ „

RESOLUTION.—In Public Works Department Resolution Nos. 619—38 A—G, dated 20th July 1876, a report was called for on the supplies which are now procured from England, but which can be obtained by manufacture in India. Some of the answers which have been received would appear to indicate a misapprehension of the real scope and object of the inquiries made, and His Honor the President in Council therefore considers it necessary to state that what is wanted is a full report on the subject from the several Governments and Administrations, and not merely copies of isolated reports from Executive Engineers.

2. The scope of the report should not be confined to a bald enumeration of what is obtained at present from England by indent on the Secretary of State, and what should be so obtained for the future, but should deal with the whole question of stores of Europe manufacture used in connection with public works. It should suggest and discuss whatever may seem possible in the way of substituting for them articles of local manufacture, and what steps should be taken by Government to encourage such manufacture.

3. Thus in the case of tools and plant, indents are sometimes received for transmission to the Secretary of State for such stores as spades, pickaxes, and shovels. His Honor the President in Council has no doubt that on inquiry it will be found that it is possible to obtain articles of local manufacture which will be sufficient for the purpose in view. What is wanted are suggestions to provide for this being done.

4. Then the demand of the Public Works Department for articles of small stores, such as bolts, screws, and nails, must necessarily be large. As a rule the articles used are of Europe manufacture. The question of whether some practical measures should not be taken for using articles of local manufacture in preference is one that might well be considered at length.

5. Similarly, in respect to iron girders, castings, and iron-work of all kinds. It is possibly the case that iron-work for the construction of bridges may not be procurable in sufficient quantities in India. But the Government of India sees no reason why this circumstance should deter inquiries being made whether by timely arrangements it will not be possible to obtain some of these articles by manufacture at the several Government workshops.

6. It is not the desire of the Government of India that articles of local manufacture should be used when they are greatly inferior to articles of English manufacture, or more costly, or not sufficiently good for practical purposes, when consequently their use would militate against the efficiency and economy of the work of the Department. What is wanted is that with due regard to economy and good workmanship, every encouragement should be afforded to the use of articles of local manufacture, and the object in view is to ascertain how such encouragement may best be afforded.

The Governments of Madras, Bombay, Bengal, North-Western Provinces and Punjab, in the Public Works Department, General and Irrigation Branches.
The Chief Commissioners of Oudh, Central Provinces, British Burmah, Mysore and Coorg, and Assam.
The Resident at Hyderabad.
The Agents to the Governor-General for Central India and Rajpootana.
The Superintendent of Port Blair, and Chief Commissioner, Andaman and Nicobar Islands.
The Director-General of Telegraphs.
The Inspector-General of Military Works.
The Director of State Railways.
The Director-in-Chief, Indo-European Telegraph.
The Director, Persian Telegraph.
The Deputy Director, Persian Gulf Telegraph.

ORDER.—Ordered, that this Resolution be forwarded to all Local Governments and Administrations and Officers noted in the margin for information and guidance.

(Signed) A. B. SAMPSON,
Under Secretary to the Govt. of India.

No. 467-A. Endorsement of the District Engineer, Presidency, dated Fort St. George, 23rd November 1876, No. 4,541:—

From J. N. GRAINGER, Esq., F.R.S.N.A., &c., General Superintendent, Public Works Stores and Workshops, to Major H. M. VIBART, R.E., Officiating District Engineer, Presidency, dated Madras, 21st November 1876, No. 1,159.

WITH reference to your endorsement No. 3,203, of 12th September 1876, on G.O., No. 186, of 26th August 1876, I have the honor to state that having carefully considered the nature of the supplies obtained from England and the condition of manufactures in this country, I do not consider it possible *at present* to substitute articles of Indian manufacture or production for the supplies obtained from England. It is, however, quite possible to reduce the amount of stores obtained from England in future if officers in the districts will utilize to the utmost the English stores already supplied them and those now in store.

The supplies obtained from England are:—

Fuel.	Machinery.
Metals.	Miscellaneous small stores.
Tools and Plant.	Scientific Instruments and Drawing Materials.

Fuel.—Coal and coke are the two items under this head usually obtained from England. The greater part of the coal used in the Public Works Workshops is Indian coal obtained from Calcutta, and is nearly equal to English coal for smith's work and stationary boilers, but is not good for making the coke required for use in the foundry or reduction of iron from the ore, so that until a good coke making coal can be found in India it will be necessary to obtain supplies of coke from England if only for foundry use.

Note.—The cost of English coal averages Rupees 28 per ton and Calcutta coal Rupees 23 in the Madras market.

Metals.—Cast iron, wrought iron, steel, copper, &c.

The economical use of metal in construction necessitates the *form* of the metal in its "ran" state being as near as possible the same as in the finished article or structure, i.e., bolts, rivets, &c., can only be made cheaply from round bar iron, and girders, &c., from plate, bar and angle iron, and so on for the other metals; hence the employment of metals in construction necessitates their present marketable forms, and as these forms are not obtainable at present in Madras of Indian manufacture the English market must be resorted to. There is a small quantity of iron manufactured by the natives, but it is generally in the form of short irregular bars or lumps, of forms suitable only for making hammers; the iron, however, being far too good for such use is generally converted into agricultural implements.

Tools and Plant.—The manufacture of tools has been brought to a high state of perfection in England, so that the cost of making a tool there is much less than the cost of making the same tool here, and as the material of which the tool is made must generally come from England, it is certainly the cheapest plan to obtain the tools from England in the first instance.

The same may be said even more forcibly of *Machinery, Miscellaneous small stores and Scientific Instruments and Drawing Materials*. The amount of the home indent may be reduced to a minimum by carefully considering the possibility of repairing tools, instead of condemning them and then indenting on the stores for new ones, which of course have to be replaced by indent on England.

Take for instance the case of a mamoty said to be worn out, the thought of repairing it for departmental use by riveting on a new blade seems seldom to occur to any one, or if it does there are probably no funds to do it with; so an indent is made on the stores for a new one which is issued, in the majority of cases *without payment*, and the old mamoty is sold off. The party buying it gets it repaired and probably uses it on Government work afterwards.

A similar remark might also be made of pickaxes, crowbars, jumpers, &c., and of drawing instruments, &c.

The number of boxes of mathematical instruments issued to the districts from 1862 to September 1876, and the number returned into store during the same period is shown in the accompanying statement A, which shows that during this period 1,063 boxes of sorts have been issued and 412 returned to store as unserviceable, but it will be seen that of the boxes returned only a few could be from the 1,063 issued, as the greater part were returned to store in 1864, and from the number and date of these and the succeeding returns it seems as if they were the old instruments in use in the districts previous to 1862.

Assuming the number of persons in the department requiring instruments during the above period to be the same as at present, I find from the last published Public Works Establishment List that officers, subordinates, and draughtsmen make a total of 441 persons, for whom 1,063 boxes of instruments have been issued during 14.5 years. In fact the number of 1st and 2nd class boxes alone (553) issued is more than sufficient for the requirements of the department, as such instruments should certainly last longer than 14.5 years if properly taken care of.

Of course there are temporary establishments that require instruments which are not taken account of in the above, but then the number of officers and subordinates who may have been on leave has not been deducted from the numbers on the establishment list, as the two would probably be equal.

The total number of instrument boxes in the districts on 31st March last was 649 as shown in Statement B, which agrees very nearly with the total balance (651) shown in Statement A, but these balances cannot possibly be of the same instruments, else the total number in use previous to 1862 are *unaccounted for*.

I have taken instrument boxes as an example of a seeming want of economy in the use of drawing materials. A similar statement of colour boxes would probably be more startling.

I think it quite possible that all the colours required for departmental use could be supplied by country manufacture and in cakes only, the issue of English boxes of colours being discontinued.

The Collectors of districts would be able to give more information regarding the colours procurable in their districts than I can.

In the above I have endeavoured to show that at present a more economic use of English stores is possible.

The Government of India Circular No. 70 of 1876, paragraph 2, communicated with G.O., No. 61, of 10th November 1876, requests the suggestion of steps for improving local manufactures as a substitute for English stores.

The basis of manufacture is fuel. I fear, therefore, that this country will not be in a position to be independent of the English market until a good and cheap fuel is obtainable.

We may, however, improve and utilize the metal manufactures with our present fuel supplies in face of the failures of the Porto Novo, Beypore, and other iron-works established at times in this country by private enterprise, where every endeavour has been made to make them pay.

Their failure is, I think, attributable to the fact of their being worked on the English principle of reduction of iron from the ore, instead of the Indian or the Persian method. It is not necessary to enter into the detail merits of these methods here, as a comparison of the ore and fuel found in each country will be sufficient to prove my statement.

Of the quantity of iron produced in England *nine-tenths* is reduced from the argillaceous and black-band iron stones, which contains about 30 per cent. of iron. The iron is first obtained from them as crude cast iron, the fuel consumed being about $2\frac{1}{2}$ tons per ton of metal. The further conversion of this into wrought iron requires 1 ton of fuel, so that in the production of 1 ton of wrought iron $3\frac{1}{2}$ tons of fuel are consumed.

In India the ore (*peroxide* principally) is rich, and contains about 70 per cent. of iron, which is obtained as wrought iron *direct*, that is without passing *en masse* through the cast iron state. The fuel used is charcoal, 300 lbs. of which is required to reduce 100 lbs. of wrought iron of excellent quality. We can, therefore, safely state that relatively the ore is poor and fuel abundant in England, whilst the ore is rich and fuel scarce in India, and therefore the English method must of necessity fail in this country.

In spite of the fuel disadvantages the natives with their simple appliances, and working in a very small way, can reduce the iron with less expenditure of fuel than is done in England, where the steam-engine and blast-furnace have been brought to such perfection. Moreover, the native iron finds a ready market in England on account of its excellence, which is owing to the purity of the ore and fuel.

With these facts before us our first step will be to *increase* not *improve* the manufacture of native iron by creating a demand for it. This can only be done by Government, owing to these petty manufactories being scattered about the country, and because private enterprise has already failed.

This demand will increase the quantity manufactured, and with such increase improvements in the method of manufacture, suitable to the resources of the country, can and will be made.

This demand should be raised in a manner that will not interfere with the liberty of the iron workers to sell the iron in any market, and also that no loss should be incurred by Government in case of failure of the scheme.

The iron (rough lumps) made in the native furnaces must be reduced to forms and sizes similar to the English marketable forms, before it can be economically used in works of construction.

This will necessitate the erection of rolling mills and other machinery in a suitable place where fuel (coal and charcoal) is cheap and abundant and a ready market available, to which the iron could be brought by railway, bullock-bandies or vessels. This would probably be Madras at first.

But before going to the expense of erecting the machinery it will be necessary to ascertain whether sufficient iron can be thus obtained to keep a small mill in work, if only for six months in the year, and whether it can be worked up and put in the market at a price which will find purchasers. Government should, therefore, establish a store where all the iron received from the districts can be stored, say for twelve months or two years, by which time its quantity and price would be known, and Government would then be in a position to decide on the expediency of erecting the rolling mills.

Should the result of this step be unsatisfactory the iron thus collected can easily be shipped to England, where it will find a ready market and no loss need be incurred by Government.

I am unable at present to give even roughly the quantity of iron likely to be collected, and cannot, therefore, ask for funds to be placed at my disposal for such a purpose; but if Government would permit me to visit the most promising districts, I could with the aid of the Collectors obtain data for framing an estimate as well as other useful information connected with this subject, the details of which should certainly be laid before Government when deciding on such a question as the manufacture of iron in India.

If iron manufacture can be established, the production of copper, zinc, tin, and lead will soon follow, and the country will then be in a good position to commence the manufacture of the various articles of tools and plant, machinery, small stores, &c., and thus be independent of the English market.

The Mathematical Instrument Department of the workshops will be in a position to manufacture all surveying and levelling instruments, ivory, boxwood and

cardboard scales, &c., required by Government, when the dividing and engraving machines now in store are erected. I beg, therefore, that sanction may be obtained for the preparation of a suitable building for this purpose, it will probably cost about Rupees 20,000.

In the above I have endeavoured to point out the means of substituting country manufacture and produce for English stores as far as this department is concerned, and I trust that Government will be pleased to take the necessary steps at an early date as it will take some time before results can be obtained.

SUBMITTED to the Chief Engineer and Secretary to Government, Public Works Department, with reference to G.O., No. 186, dated 26th August 1876.
Two Statements.

(Signed) H. M. VIBART, Major, R.E.,
Officiating District Engineer, Presidency.

No. 468. ORDER THEREON, 19th February 1877, No. 561.

ACCOUNT, No. 21.

ORDERED that the Government of India be addressed.

2. The report framed by the Superintendent of Public Works Stores will be communicated to all District Engineers for information.

3. His Excellency in Council attaches much importance to endeavours on the part of Public Works Officers to discourage to the best of their power wholesale condemnation of old tools. He concurs with the Superintendent in considering that in a great majority of cases timely repair of old tools would obviate the necessity for indenting upon the stores for new ones. He conceives that more saving may be hoped for in this direction than in the substitution of country-made for English tools.

4. He desires that a vigilant watch upon the demands from the districts for new tools may be maintained by the Superintendent of the Workshops and Stores.

(Here enter No. 562, dated 19th February 1877.)

(True Extract.)

Colonel,
Acting Joint Secretary to Government.

To the District Engineers.

Exd. S. T. Austin.
Spare Copies

No. 469.

No. 562.

FROM

THE ACTING JOINT SECRETARY TO THE GOVT. OF MADRAS,
Public Works Department, Buildings and Roads Branch,

TO

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

ACCOUNT, No. 22.

SIR,—With reference to Government of India Circular No. 70 of 1876, Public Works Department, Account, I am directed

to reply that the supplies obtained from England in the Public Works Department of this Government are—

Fuel.

Metals.

Tools and plant.

Machinery.

Miscellaneous small stores.

Scientific and Drawing Instruments.

2. I am further to state that the whole question of economic manufacture in India turns upon that of fuel, and until fuel is sufficiently cheap to allow of its use in India at the same rates at which it is available in England, no saving is likely to be effected by local manufacture on a scale sufficiently extensive to supersede the necessity of home indents.

3. The local manufacture of pickaxes, mamooties or powrahs, and such rude tools will be encouraged to the utmost extent, and every endeavour will be made to use articles of all kinds obtainable of country-make.

4. I am also to say that in conformity with the assurances conveyed to the Government of India by General Walker's letter, No. 2,827 of the 23rd October 1876, strict scrutiny will be made of all indents sent from districts, and District Engineers will be urged to do their best to repair all tools as much as possible, and the strictest economy in the issue of new ones will be enforced.

G.O., No. 561, dated 19th February 1877.

5. I am to forward a copy of the Proceedings quoted in the margin.

I have the honor to be,

Sir,

Your most obedient servant,

Colonel,
Acting Joint Secretary to Government.

Exd. S. T. Austin.
Spare Copies

Circular No. 70 of 1876.

GOVERNMENT OF INDIA.
PUBLIC WORKS DEPARTMENT.

ACCOUNT.
General.

Simla, October 26, 1876.

Read again:—

Public Works Department Resolution Nos. 619—33 A—G, dated 20th July 1876.

Read also the following:—

Letter from Secretary to Government, North-Western Provinces, No. 335, dated 6th September 1876.

Letter from Secretary to Chief Commissioner, British Burmah, No. 3356, dated 7th September 1876.

Letter from Secretary to Government, Punjab, No. 4300, dated 23rd September 1876.
" from " " " " 4240 A, " 14th " "

RESOLUTION.—In Public Works Department Resolution Nos. 619—33 A—G, dated 20th July 1876, a report was called for on the supplies which are now procured from England, but which can be obtained by manufacture in India. Some of the answers which have been received would appear to indicate a misapprehension of the real scope and object of the enquiries made, and His Honor the President in Council therefore considers it necessary to state that what is wanted is a full report on the subject from the several Governments and Administrations, and not merely copies of isolated reports from Executive Engineers.

2. The scope of the report should not be confined to a bald enumeration of what is obtained at present from England by indent on the Secretary of State, and what should be so obtained for the future, but should deal with the whole question of stores of Europe manufacture used in connection with public works. It should suggest and discuss whatever may seem possible on the way of substituting for them articles of local manufacture, and what steps should be taken by Government to encourage such manufacture.

3. Thus in the case of Tools and Plant, indents are sometimes received for transmission to the Secretary of State for such stores as spades, pickaxes, and shovels. His Honor the President in Council has no doubt that on enquiry it will be found that it is possible to obtain articles of local manufacture which will be sufficient for the purpose in view. What is wanted are suggestions to provide for this being done.

4. Then the demand of the Public Works Department for articles of small stores, such as bolts, screws, and nails, must necessarily be large. As a rule the articles used are of Europe manufacture. The question of whether some practical measures should not be taken for using articles of local manufacture in preference is one that might well be considered at length.

P. W. D. No. 562—G. C. B. Press—27-10-76—950.

5. Similarly in respect to iron girders, castings, and iron-work of all kinds. It is possibly the case that iron-work for the construction of bridges may not be procurable in sufficient quantities in India. But the Government of India sees no reason why this circumstance should deter enquiries being made whether by timely arrangements it will not be possible to obtain some of these articles by manufacture at the several Government workshops.

6. It is not the desire of the Government of India that articles of local manufacture should be used when they are greatly inferior to articles of English manufacture, or more costly, or not sufficiently good for practical purposes, when consequently their use would militate against the efficiency and economy of the work of the Department. What is wanted is that with due regard to economy and good workmanship, every encouragement should be afforded to the use of articles of local manufacture, and the object in view is to ascertain how such encouragement may best be afforded.

The Governments of Madras, Bombay, Bengal, North-Western Provinces and Punjab, in the Public Works Department, General and Irrigation Branches.

The Chief Commissioners of Oudh, Central Provinces, British Burmah, Mysore and Coorg, and Assam.

The Resident at Hyderabad.

The Agents to the Governor General for Central India and Rajpootana.

The Superintendent of Port Blair, and Chief Commissioner, Andaman and Nicobar Islands.

The Director General of Telegraphs.

The Inspector General of Military Works.

The Director of State Railways.

The Director-in-Chief, Indo-European Telegraph.

The Director, Persian Telegraph.

The Deputy Director, Persian Gulf Telegraph.

ORDER.—Ordered, that this Resolution be forwarded to all Local Governments and Administrations and officers noted in the margin for information and guidance.

W. S. Sampson
~~Major Genl. R. E.,~~

Offg. Secretary to the Govt. of India.

To
The Secretary to the Government of Madras.
Public Works Department.

mis No 61 of 10 Nov/76
 Communicated to the Supt
 of P.W. Workshops who
 will submit the report
 called for at an early
 date.

Wk
 8.11.76.

GOVERNMENT OF INDIA
 PUBLIC WORKS DEPARTMENT.
Profor Novmbr
 ACCOUNT. P.W.D.
 General.

8 Nov 76

No 8071

- To
- The Governments of Madras, Bombay, Bengal, North-Western Provinces and Punjab, in the Public Works Department, General and Irrigation Branches.
 - The Chief Commissioners of Oudh, Central Provinces, British Burmah, Mysore and Coorg, and Assam.
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 - The Director, Persian Telegraph.
 - The Deputy Director, Persian Gulf Telegraph.

Circular No. 70 of 1876.
 Dated SIMLA, October 26, 1876.
 Received

Calls for the submission of a detailed report showing articles of stores which are now procured from England, but which can be obtained by manufacture in India.

No 61.
 Of Presidency -
 in inf draft
 with 15 copies of copy.

No 61

W. H. Jones

Description of Tools.	Workshop notes			English notes			Remarks.
	Size.	Rate	Qty	Size	Rate	Qty	
Pick. Shovel. Iron. Steel pointed.	5th	1	5th	5th	1	11	If no other work is in hand and all the smiths are put to work pick axes - 1000 can be turned out in 3 days.
Pick. Shovel. Iron. Steel pointed.	6th	1	6th	6th	1	15	
Pick. Shovel. Iron. Steel pointed.	7th	1	7th	7th	1	19	
Pick. Shovel. Iron. Steel pointed.	8th	1	8th	8th	1	23	
Pick. Shovel. Iron. Steel pointed.	9th	1	9th	9th	1	27	
Pick. Shovel. Iron. Steel pointed.	10th	1	10th	10th	1	31	
Pick. Shovel. Iron. Steel pointed.	11th	1	11th	11th	1	35	
Pick. Shovel. Iron. Steel pointed.	12th	1	12th	12th	1	39	
Pick. Shovel. Iron. Steel pointed.	13th	1	13th	13th	1	43	
Pick. Shovel. Iron. Steel pointed.	14th	1	14th	14th	1	47	
Shovel. Hammer. Iron. Steel pointed.	15th	1	15th	15th	1	51	20 - 20 - 1000 can be made in 2 days.
Shovel. Hammer. Iron. Steel pointed.	16th	1	16th	16th	1	55	
Shovel. Hammer. Iron. Steel pointed.	17th	1	17th	17th	1	59	
Shovel. Hammer. Iron. Steel pointed.	18th	1	18th	18th	1	63	
Shovel. Hammer. Iron. Steel pointed.	19th	1	19th	19th	1	67	
Shovel. Hammer. Iron. Steel pointed.	20th	1	20th	20th	1	71	
Shovel. Hammer. Iron. Steel pointed.	21st	1	21st	21st	1	75	
Shovel. Hammer. Iron. Steel pointed.	22nd	1	22nd	22nd	1	79	
Shovel. Hammer. Iron. Steel pointed.	23rd	1	23rd	23rd	1	83	
Shovel. Hammer. Iron. Steel pointed.	24th	1	24th	24th	1	87	
Shovel. Hammer. Iron. Steel pointed.	25th	1	25th	25th	1	91	20 - 20 - 1000 can be made in 2 days.
Shovel. Hammer. Iron. Steel pointed.	26th	1	26th	26th	1	95	
Shovel. Hammer. Iron. Steel pointed.	27th	1	27th	27th	1	99	
Shovel. Hammer. Iron. Steel pointed.	28th	1	28th	28th	1	103	
Shovel. Hammer. Iron. Steel pointed.	29th	1	29th	29th	1	107	
Shovel. Hammer. Iron. Steel pointed.	30th	1	30th	30th	1	111	
Shovel. Hammer. Iron. Steel pointed.	31st	1	31st	31st	1	115	
Shovel. Hammer. Iron. Steel pointed.	32nd	1	32nd	32nd	1	119	
Shovel. Hammer. Iron. Steel pointed.	33rd	1	33rd	33rd	1	123	
Shovel. Hammer. Iron. Steel pointed.	34th	1	34th	34th	1	127	

23/1/77
J. H. Mansel

[illegible]

113
J. H. Granger
General Superintendent of the Western Work

P.W.D.
24 NOV 76
NA 8530

Statement B.

17
L. J. Granger
General Secy. of the Mass. Hort. Socy.

Madras
21. November 1876

P.W.D.
124 NOV 76
No. 8580

Statement B

Enclosure with letter
No 1159 dated 21st
November 1876 from
the General Superintendant
P.W.D. Stores Dept. to the
District Engineer
Presidency

467@69

No 2 Endo. Ready
Public Works Store Department.
Madras 21st November 1876.
No 1159
From

C. K. Lyrainger Esq. & Co. S. A. 88
General Superintendant
Public Works Stores and Workshops

To
Major St. Milbairt Esq.
Offg. District Engineer Presidency
Fort Saint George

Sir
With reference to your endorsement
No 3203 of 12th September 1876 on G.O. No 186
of 26th August 1876 I have the honor to state
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Metals
Tools and Plant

Machinery

Machinery
Miscellaneous Small Stones
Scientific Instruments and
Drawing Materials.

Fuel. Coal and coke are the two items under this head usually obtained from England. The greater part of the Coal used in the Public Works Workshops is Indian coal obtained from Calcutta and is nearly equal to English coal for Smith's work and Stationary Boilers but is not good for making the coke required for use in the foundry or reduction of iron from the ore so that until a good coke making coal can be found in India it will be necessary to obtain supplies of coke from England if only for foundry use.

(Note) The cost of English coal averages Rupees 28/- per ton and Calcutta coal Rupees 23/- in the Madras Market.

Metals. Cast Iron, Wrought Iron, Steel, Copper &c.

The economical use of metal in construction necessitates the form of the metal in its "raw" state being as near as possible the same as in the finished article or structure. i.e. Bolts, Rivets &c. can only be made

cheaply from round bar iron and
L-shaped from plate, bar and
Angle iron and so on for the other
metals hence the employment
of metals in construction necessitates their present marketable form and as these forms are not obtainable at present in Madras of Indian manufacture the English Market must be resorted to. There is a small quantity of iron manufactured by the Natives but it is generally in the form of short irregular bars or lumps of forms suitable only for making hammers the iron however being far too good for such use is generally converted into Agricultural implements.

Tools and Plant. The manufacture of tools has been brought to a high state of perfection in England so that the cost of making a tool there is much less than the cost of making the same tool here and as the material of which the tool is made must generally come from England it is certainly the cheapest plan to obtain the tools from England in the first instance.

The same may be said even more forcibly of Machinery, Miscellaneous

Small

Small Stores and Scientific Instruments
and Drawing Materials. The amount
of the same indent may be reduced to a
minimum by carefully considering the
possibility of repairing tools instead of
condemning them and then indenting
on the stores for new ones which of course
have to be replaced by indent on England.

Take for instance the case of a
manotype said to be worn out: the thought
of repairing it for Departmental use by
riveting on a new blade, seems seldom
to occur to any one or if it does, there
are probably no funds to do it with, so
an indent is made on the Stores for a
new one which is issued, in the majority
of cases without payment and the old
manotypes sold off. The party buying it
gets it repaired and probably uses it on
government work afterwards.

A similar remark might also be
made of Pick axes, Crowbars, Iron pers &c.
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The number of Boxes of Mathematical
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that of the Boxes returned only a few could
be from the 1063 issued as the greater

part were returned to Store in 1861, and
from the number and date of these and the
succeeding returns it seems as if they were
the old instruments in use in the District
previous to 1862.

Assuming the number of persons in
the Department requiring instruments during
the above period to be the same as at present
I find from the last published Public Works
Establishment List that Officers, Subordinates
and Draughtsmen make a total of 111 persons
for whom 1063 Boxes of instruments have been
issued during 14.5 years. In fact the number
of 1st and 2nd Class Boxes alone (553) issued is
more than sufficient for the requirements
of the Department as such instruments
should certainly last longer than 14.5 years
if properly taken care of.

Of course there are temporary Estab-
lishments that require instruments which
are not taken account of in the above but
then the number of Officers and Subordinates
who may have been on leave has not been
deducted from the numbers on the Estab-
lishment List as the two amounts probably
be equal.

The total number of instrument boxes
in the Districts on 31st March last was 649
as shown in Statement B which agrees
very nearly with the total balance (651)
shown in Statement A but these balances
cannot possibly be of the same instruments
else the total number in use previous

to 1862 are unaccounted for

I have taken Enamelled Boxes as an Example of a seeming want of economy in the use of Drawing Materials. A similar statement of Colour Boxes would probably be more startling.

I think it quite possible that all the Colours required for Departmental use could be supplied by country Manufacture and in Calcutta only - the issue of English Boxes of Colours being discontinued.

The Collectors of Districts would be able to give more information regarding the Colours procurable in their Districts than I can.

In the above I have endeavoured to show that at present a more economical use of English Stores is possible.

The Government of India Circular No 70 of 1876 para 2 communicated with L. O. No 61 of 10th November 1876, requests the suggestion of steps for improving local Manufactures as a substitute for English Stores.

The basis of Manufacture is fuel. I fear therefore that this Country will not be in a position to be independent of the English Market until a good and cheap fuel is obtainable.

We may however improve and utilize the Metal Manufactures with our present fuel supplies in face of the failures of the Porto Novo, Beyerport and other iron

works established at times in this Country by private enterprise where every endeavour has been made to make them pay.

Their failure is I think attributable to the fact of their being worked on the English principle of reduction of iron from the ore instead of the Indian or the Persian method. It is not necessary to enter into the detail merits of these methods here as a comparison of the ore and fuel found in each country will be sufficient to prove my statement.

Of the quantity of iron produced in England, nine tenths is reduced from the Argillaceous and Blackband iron stones which contains about 30 per cent of iron. The iron is first obtained from them as crude cast iron the fuel consumed being about 2 1/2 tons per ton of metal. The further conversion of this into wrought iron requires 1 ton of fuel so that in the production of one ton of wrought iron 3 1/2 tons of fuel are consumed.

In India the ore (peroxide principally) is rich and contains about 70 per cent of iron which is obtained as wrought iron direct that is without passing en masse through the Cast iron state. The fuel used is charcoal, 300 lbs of which is required to reduce 100 lbs of wrought iron of excellent quality. We can therefore safely state that relatively the ore is poor and fuel abundant in England whilst the ore is

is rich and fuel scarce in India and therefore the English method must of necessity fail in this Country.

In spite of the fuel disadvantages the Natives with their simple appliances and working in a very small way can reduce the iron with less expenditure of fuel than is done in England where the Steam Engines and Blast Furnace have been brought to such perfection. Moreover the Native iron finds a ready market in England on account of its excellence which is owing to the purity of the ore and fuel.

With these facts before us our first step will be to increase not improve the manufacture of Native iron by creating a demand for it. This can only be done by Government owing to these petty manufactures being scattered about the country and because private enterprise has already failed.

This demand will increase the quantity manufactured and with such increase improvements in the method of manufacture suitable to the resources of the country can and will be made.

This demand should be raised in a manner that will not interfere with the liberty of the iron workers to sell the iron in any market and also that no loss should be incurred by Government in case of failure of the scheme.

The iron (rough lumps) made in

275
the Native furnaces must be reduced to forms and sizes similar to the English marketable forms before it can be economically used in work if constructed.

This will necessitate the erection of Rolling Mills and other machinery in a suitable place where fuel (Coal and Charcoal) is cheap and abundant and a ready market available, to which the iron could be brought by Railway, Bullock, bandies or vessels. This would probably be Madras at first.

But before going to the expense of erecting the Machinery it will be necessary to ascertain whether sufficient iron can be thus obtained to keep a small mill in work if only for six months in the year and whether it can be worked up and put in the market at a price which will find purchasers. Government should therefore establish a store where all the iron received from the Districts can be stored say for twelve months or two years by which time its quantity and price would be known and Government would then be in a position to decide on the expediency of erecting the Rolling Mills.

Should the result of this step be unsatisfactory the iron thus collected can easily be shipped to England where it will find a ready market and no loss need be incurred by Government.

I am unable at present to give even roughly the quantity of iron likely to be collected and cannot therefore ask for funds to be placed at my disposal for such a purpose but if Government would permit me to visit the most promising Districts & confer with the aid of the Collectors obtain data for framing an Estimate as well as other useful information connected with this subject the details of which should certainly be laid before Government when deciding on such a question as the Manufacture of Iron in India.

If Iron Manufacture can be established the production of Copper Zinc, and Lead will soon follow and the country will then be in a good position to commence the Manufacture of the various articles of Tools and Plant, Machinery, Small Stores & thus be independent of the English Market.

The Mathematical Instrument Department of the Workshops will be in a position to manufacture all Surveying and Levelling Instruments Iron, Boxwood and Cardboard Scales & required by Government when the Dividing and Engraving Machines now in store are erected. I beg therefore that sanction may be obtained for the preparation of a suitable

Building for this purpose. it will probably cost about Rupees 20000.

In the above I have endeavoured to point out the means of substituting Country Manufacture and produce for English Stores as far as this Department is concerned and trust that Government will be pleased to take the necessary steps at an early date as it will take some time before results can be obtained.

I have the honor to be

Yours Most Obedt Servant

J. H. Mungey Esq. Secy to Govt
Genl Supl to Stores & Workshops.

P.W.D.
4476
8530

Reports on the
utilization of native
products and manu-
factures & for Europe
stores

Placed in } Nov 1896
Dec 11/97 }
in enclosure (over)

From
The General Supt
of the Stores & Workshops
Chief District Engineer
Presidency

Encl.
2. State
narrative

Submitted to the Chief Engineer
and Secretary to Government P.W.D.
with reference to G.O. No. 188 dated
26th August 1896.

No. 4541

Henry W. Michael

Chief District Engineer

Presidency

14.2.97

For St. Petersburg
23 Nov. 96.

Recd. 9/1

3 Feb 97

No 361 Public Works Department.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Under date the 19 Feb/97
Read the following:—

From the Govt of India (H.R. No 70 of 26 Oct/96)
The Genl Supt of the Stores & Workshops
thru the Dist Engr. Presidency (No. 4541 of 23rd Nov. 96)

Ordered that the
Government of India be
addressed.
2. The report framed by
the Superintendent of Public
Works Stores will be com-
municated to all District
Engineers for information.
3. This Resolution in Council
attaches much importance
to endeavours on the part
of Public Works Officers to
discontinue the use of
their former wholesale con-
sumption of old tools.

W.P.

He concurs with the Superintendent in considering that in a great majority of cases a ~~little~~ timely repair of old tools would obviate the necessity for indenting upon the stores for new ones.

He conceives that more saving may be hoped for in this direction than in the substitution of country made for English tools.

He desires that a vigilant watch upon the demands from the districts for new tools may be maintained by the Superintendent of the Workshops and Stores.

(G.O. No 562. of 19 Feb/77)

Sl. - / brsp 12.3.77
Ch. L. for Dir.

No 562 of 19 Feb/77 10
To
The Secretary to the
Government of India Madras

Sir,
With reference to Govt. of India Circular No 10 of 1876 Public Works Dept. Account I am directed to reply that the supplies obtained from England in the P.W. Dept. of this Government are

Fuel

Metals

Tools and Plant

Machinery

Miscellaneous small stores

Scientific and Drawing

Instruments.

2. I am further to state that the whole question of economic manufacture in India turns upon that of Fuel and until Fuel is sufficiently

Cheap to allow of its use in
India at the same rates at
which it is available in
England no saving is likely
to be effected by local ma-
nufacture on a scale suffi-
ciently extensive to supersede
the necessity of some imports.

3. The local manufacture of
Pick axes, mattocks, axes,
Pawls and such tools
will be encouraged to the
utmost extent and every
endeavour will be made to
use articles of all kinds ob-
tainable of country make.

4. I am also to say that
in conformity with the
assurances conveyed to the
Government of India by
General Walker's letter No.
2027 of the 23rd October 1876,

25071
strict scrutiny will be
made of all indentos sent
from Districts, and District
Magicians will be urged to
do their best to repair all
tools as much as possible,
and the strictest economy
in the issue of new ones
will be enforced.

5. I am to forward a
G. O. No. 561 of 19th July 1877 copy of the Proceedings
quoted in the margin!

Brpd-12-3-77

W.H.
14.2.77

Original
G.O. of 1877 Madras.
PUBLIC WORKS.

To *The Public Engineers.*

Dated

Issued

Recd.

Encl.

G. O. 19 Feb 1877, No. 467

Nos. 467 & 69

*Stores. Passing order on
papers relating to the econo-
mical manufacture in
India of — hitherto obtained
by Indents from England*

Left no copy