

Memoranda
upon
The nature and value
of Materials
as also on Labour in
Canada
from information in the
Office of
The Commanding Engineer
1841.

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Considering it, expedient, that the Officers of Engineers, Clerks and Foremen of Works should as soon as possible after their arrival in this Country, be made acquainted with the nature and prices of Materials generally used in the several districts in this extensive command as well as the price of Labour.

Lieut^t. Colonel Oldfield, caused certain queries to be put to the several Clerk of Works in the Canadas. Their replies in a condensed form are now circulated for the information of the Department.

Masons and Bricklayers Materials

Stones

Madawaska Little Falls

The stone at the Little Falls resembles the common black stone of Quebec and being very slaty splitting into thin laminae is not at all calculated for any building exposed to
at=

atmosphere action? There is no building stone nearer than Lake Temiscouata.

Degele

The remarks upon Building Materials at the Little Falls will apply to the Degele in the absence of any further information.

Lake Temiscouata

Lime Stone for building can be mined at the side of the Lake opposite the Barracks.

Riviere du Loup

Lime Stone can easily be procured at this place of sufficiently good quality for common Building purposes.

Quebec

The building Stone found in the neighbourhood of Quebec is of different kinds.

1st The common black rock or clay slate on which the Citadel is built. This Stone contains a good

deal of Iron, will not bear exposure to the weather, and consequently although formerly extensively used is now only resorted to by the poorer classes, when used by them it is generally plastered or clap-boarded on the outside.

2nd The Beauport stone: the quarries of which are from 4 to 6 miles from Quebec, this stone is blue Lime Stone, and is found in strata from 2 to 5 inches thick, and though much used by the Habitans it never is by this Department: as the walls of which it is built are generally damp.

3rd The Auge Gardien Stone is a compact sand Stone found 12 miles below Quebec on the left bank of the river in strata from 2 to 5 inches thick and is used for arches. A few quarries supply a similar Stone to the latter in beds from 4 to 8 inches thick, but it does not stand long exposed to the weather. A quarry has been very recently opened which appears to furnish

a superior material for rubble or hammer dressed masonry, in beds from 18 inches to 3 feet thick it splits very square both on the beds and face and requires but little additional work for hammer dressed masonry, but it is too hard to cut.

4th A compact sand stone got at Chateau Richer about 15 miles below Quebec on the North shore in beds varying from 6 to 10 inches; this is a very good building material but it cannot be found in any large quantity.

5th The La Poudre primitive trap stone, the quarries of which are very extensive and situated 7 miles above Quebec on the left bank of the St. Lawrence is a very durable material and may be procured of large dimensions and in any quantity; the quarries are situated close to the river, and the stone is much used by the Department where plain work only is required.

6th Pointe aux Trembles siliceous limestone, the quarries are situated

(5.)
30 miles above Quebec, and one mile
from the left bank of the river, it
can be procured in any quantity
in courses from one to two feet high
on the face and is employed by
the Department in the construction
of all superior works.

Three Rivers

There is no building stone at this
station except broken granite in
boulders found on the surface of
the ground; it makes a very neat
front, but it would be difficult to
obtain a large quantity,

Montreal

The only building stone in the
vicinity of Montreal is carbonated
lime stone of an excellent quality
fit for masonry of every description;
the first strata is full of rents and
therefore will not bear cutting, but
at the depth of six or seven feet where
the second strata is gained, Ashlar
of any size required can be obtained.
Lime stone is to be found in some
situations

situations on the surface, but it is seldom used except for making lime or for Macadamizing.

Chambly

Different kinds of stone are found here: that found in the field is a poor lime stone but very hard and containing Oxide of Iron; the stone found in the river is a hard sand stone; both kinds are fit for rubble work; but they will not bear the chisel.

St. Johns

There is a kind of lime stone found in quarries three miles from this place, it is in thin laminated strata and is very ill adapted for building; any stone that may be required for important works at this place would have to be transported from Montreal or Laprairie, excellent lime stone well calculated for all building purposes is brought to St. John's from

(7)

from the Motte Island about twelve miles on the American side of the line
45°

Isle aux Noix

The stone used at the Isle aux Noix is generally procured from the Island of Motte

Sorel

No quarries have yet been opened at this place, the large boulders found on the surface are not adapted for building purposes.

Rideau Canal

By-Town Hartwell the Hogback the Black Rapids and Long Islands. The country in the neighbourhood of these stations is formed of gray calcareous stone in beds from one to five feet deep; it splits well with plug and feather, cuts well for ashler work and produces lime of a good quality; with the exception of

of the upper courses which should be laid by for backing. The stone is well adapted for masonry of all kinds. The stone found at all the other stations on the Canal is of the same description but harder; The quarry at Merrickville produces an excellent stone for ashlar work, it is easily quarried with crow bars and splits easily with plug and feather; good lime of a brownish colour is produced from this stone.

Kingston Mills

The stone in this neighbourhood is granite covered with a blue lime stone and earth; the granite is only fit for backing for thick walls the lime stone is well adapted for building; it however imbibes a good deal of moisture it makes excellent lime.

Brewers Mills

Granite and other primitives are found here and ^{also} a shaly sand stone at the upper mills. The stones are not good for building. Those used in the Canal locks were brought from distances varying from three to six miles, but are
very

very difficult to work and much discoloured by the Oxide of iron.

Jones Falls

Sand stone is abundant here but it is too shaly to work; the Ashlars for the locks which are cream-coloured sand stones were brought from a distance of six miles from the first concession of South Crosby; the quarries where this stone is got are at trifling elevations, have little covering and any required scantlings of sound Ashlars can be procured from them; the stone when first quarried is very soft, and easily worked, but soon on exposure to the atmosphere becomes hard. Granite is found at Jones Falls on the west side of the Canal, but no lime stone; that required for the Canal locks was brought from Anslers Mills a distance of $2\frac{1}{2}$ miles. —

Davis Mills, Chaffey's Mills and
the Isthmus

The

The Rocks at these stations are of the primitive kinds, but the ashlers used in building the locks of the Canal had to be procured from quarries in the vicinity of those where the ashlers were got for Jones Falls; the stones had to be drawn to these stations distances varying from 7 to 14 Miles.

Narrows

The prevailing rock is sand stone: some of it is in large loose blocks at the surface; in other places it lies in thin strata, it is difficult to quarry and ill adapted for building. With respect to the quarries along the whole line of the Rideau Canal it is to be observed, that their exploration is entirely the work of this Department when engaged in constructing the Canal.

Kingston and its vicinity

The stone common to this place and its vicinity is Limestone; it is of various

various shades, vizt. slate, blue and grey. In the Township of Pittsburgh and in the locality of Kingston Mills. granite in large masses is found under a strata of limestone; granite has also been found under limestone at Point Henry and other places in the neighborhood of Kingston. A soft stone of a faded blue colour is found above granite at Kingston Mills and Point Henry; it is totally unfit for building but makes a very good hydraulic lime. The limestone although of a very brittle nature is well calculated for building, being very durable easily quarried and worked. Ashlars with suitable beds for courses not exceeding 18 inches high can be easily procured, but beyond that limit the stones deteriorate; the grey lime stone is the hardest and most durable and should invariably be used in the exterior faces of walls being more free from the defective veins, (designated dries) crossing the layers or beds than the other specimens of lime stone; these veins are so minute that they cannot always be detected till after the stone is worked.

worked and set, which renders stones with these defects very unfit for copings as the wet and frost splits them in those places; stone of this kind should always be laid on its natural bed and should never be used in places where it would be exposed to the action of great heat as it splinters immediately on fire coming in contact with it. Kingston and its immediate vicinity is almost one mass of lime stone, and being found on the surface it is seldom quarried to a greater depth than 12 or 14 feet. The granite found in the neighbourhood is admirably adapted for the exposed faces of works of defence as it does not split when struck with a shot as is the case with limestone, but as yet it has been very little used on account of the great expense of quarrying and working it when compared with lime stone —

Toronto.

The

The only Stone to be found in this neighbourhood are stones known in Toronto as "Lake Stones" and the "Granite boulder stone"; the former are composed of the greywacke, or light blue, or silicious lime Stone, lying in beds varying from 3 to 10 inches in depth interposed with the sand rock of the Coal formation; these stones are not well adapted for building, as from their laminated nature, they do not yield to the hammer without splintering into horizontal fragments neither are they fit for the chisel, but as a great portion of them have good natural faces, and flat beds they are well suited for rubble work; the granite boulders of course are ill adapted for building; the Lake stones are procured out of the shallow waters of the lake as well as along the edge of the bank for several miles towards Oakville; the beds of this Stone visible in calm weather are six in number, lying nearly horizontal; some of the beds when exposed to the united action of the lake and the atmosphere moulder into clay; the procuring of this stone in large quantities would from its being
under

under water involve considerable, difficulty and expense. On the right bank of the Humber about two miles from its estuary there is the appearance of a quarry of the same description of stone just alluded to, apparently of better quality being in larger and thicker beds, and high up in the face of the bank out of the reach of the water; the distance however of these quarries from Toronto is 4 miles.—

Flamborough

The stone for Ashlar and other cut-work used at Toronto is generally procured from Flamborough distance 46 miles, 45 of which has a water conveyance; it is a good sand stone and easily wrought.

Queenston

A similar stone to that found at Flamborough is procurable at Queenston, tho' what has been obtained from the Military reserve there for the new Barracks now being built at Toronto is extremely hard and difficult to work both with the hammer and stone cutters tools. Halfway between Queenston and St Davids on the ridge of hills terminating on Queenston heights a stone is found which it is asserted resists the action

action of fire. and is frequently used in backs and jambs of Fire-places.

This stone appears to be a species of Granite, containing a portion of lime as it effervesces on the application of a strong acid, It can be supplied in lengths for Chimney jambs from 4 to 5 feet and 1.8" wide and in slabs for Backs of Chimnies or hearths 6" 2". It is capable of being worked to a smooth surface and of being polished; The Kingston lime stone has been used in some of the Public buildings at Toronto. A sand stone might be procured in the Township of Esquimaux about 35 miles from Toronto but it is not much used in the neighbourhood of the latter place.

Hamilton

Both Lime stone and sand stone are to be procured here in great abundance of good quality and in good workable beds; both are well adapted for building, but the sand stone is preferable. The Lime stone and the sand stone are both found in quarries in the face of the mountain ridge, the former laying above the latter.

Penetanguishene

Lime stone and granite are both found in abundance on the Islands in Lake Huron in the vicinity of this post; the former is of three kinds. The upper is a carbonate of Lime, the second is a dark bluish colour stone in beds of about 6 inches thick and the third is a silicious lime stone, the latter bed would furnish the best building stones, but the difficulty of getting at it is a great objection to using it; it is considered that the first strata would furnish either ashlers or rubble of sufficient size and quality for any building or work that might be required

Niagara

Any building stone that might be wanting at any time at this station will have to be procured from Queenston, 7 miles distant, where excellent sand and lime stone is to be had in abundance, both kinds of stone are found in quarries only a few feet under the surface and are well adapted for either rubble or ashler work.

Granite

Drummondville

Granite and a kind of free stone is found at this place; the latter is well adapted for rubble work but does not bear the chisel; the granite is both expensive to quarry and difficult to work.

Chippawa and Lyon's creeks

There is no building stone to be found nearer than Drummondville a distance of 3 miles.

Fort Erie

Abundance of excellent lime stone is to be found 3 miles from the Old Fort; also good building stone similar to the Drummondville stone; the lime stone is found in quarries near the surface, is well adapted for rubble masonry but it is rather too hard to cut or dress.

Londonderry

London

The nearest quarry to this place is 4 miles distant where very good lime stone can be had either for rubble or Ashlar work, but as the road to the quarry is very bad, the best time for collecting the stone is during the sleighing. In the immediate vicinity of the Town the only stone found is lime and sand stone in boulders from 3 to 14 inches in diameter ill calculated for building.

St Thomas

Boulders similar to those at London are found at St Thomas.

Donkeistburgh

Abundance of excellent lime stone fit for building is found in quarries near the Town.

Sandwich

Sandwich Windsor & Chatham.

It is reported that no stone calcu-
-culated for building is found
in the vicinity of these places.—

Bricks

Madawaska Degele and
Temiscouta

The Bricks used at these Stations
are at present procured from
Riviere du Loup a port on the
St^e Lawrence 36 miles from
Temiscouta.—

Quebec

Quebec

Brick earth of a very good quality is found in this neighbourhood and would no doubt if properly worked produce durable bricks; the few bricks that at present are made here by the Habitans are of the very worst discription.—

Plain tiles have lately been made by a potter which appear to be of a tolerably good quality

Three Rivers

Common place bricks can be obtained here in summer time in any quantity and very cheap.

Montreal

Very good materials for making bricks are found in this vicinity some of which requires more sand than others; but the bricks produced can only be denominated tolerable
and.

and this must be the case till
the English system of brick
making is adopted

Chumbly

With the exception of sand, abund-
-ance of brick making materials
can be procured here, but on
account of the difficulty of getting
sand no use is made of them.

St^h Johns

The materials for brick making
at this post are good, and con-
-siderable quantities of bricks
are made here of middling
quality; more care is required
in making and burning

Paprairie

Good materials for brick mak-
-ing are found here but no
bricks have yet been made
of them.

Soreb

Sorel.

A short distance from this place materials are found of which indifferent bricks have been made.---

Ile aux Noies

Good materials for brick making are found in this neighbourhood, and bricks have been made at a place 6 miles off;---

Coteau du Lac

A few bricks have been made here; good materials can be procured in the neighbourhood

Stations on the Rideau Canal.

Tolerably good materials for making bricks can be procured along the whole line of the Canal, and bricks have been made at By-town, Long Island and Smiths falls but they do not stand well

well the effects of the frost; it is more than probable that if the brick manufactories in the Canadas were superintended by experienced hands from home, as good bricks generally speaking would be produced as are to be found in most places. —

Kingston

Good materials for brick making are found here as well as at Waterloo and Long Island, and brick have been made at these Stations, but like other places in Canada of an inferior kind to what might be obtained if the materials were properly worked

Toronto

Good brick clay is to be procured in every direction in this neighbourhood, and some good bricks are made here; the brick clay in the vicinity of the New Barracks varies from 12 to 18 inches in thickness.

and is found close to the surface; that found at the east end of the City and towards the north is in beds varying from 3 to 4 feet in thickness; all the bricks made at this place when properly burnt are of a cherry red colour. The bricks made at Toronto are owing to the want of coal badly burnt; it is imagined from successful experiments made in the United States, that Anthracite coal could be used with great advantage in making bricks.—

Hamilton

Good materials for brick making are found here, and some good brick have been made with them, but here as well as at other places the proper brick making process is not adopted.—

Penetanguishene

In 1831 good materials were raised and bricks made with them, for the new Barracks, but it does not appear that any bricks have been made

made at this place since that date, those made at that time were not of a very good quality owing to the materials not being exposed to the action of the atmosphere before being worked up and to their not being properly burnt. —

Niagara

There are very good materials for brick making at this place, at present 500,000 bricks are annually made here. —

Queenston

There is good brick clay about a mile from the Village where a considerable quantity of bricks are now made. —

Drummondville

Tolerably good materials for brick making are found here, but as there is little demand for bricks very few are made.

Chippawa

Chippawa and Lyons Creeks

Any bricks required for these stations are brought from Brownsville, a distance of 3 miles.

Fort Erie

Plenty of good brick clay is found here, but very few bricks as yet have been made. —

London

The clay is not of the best quality brick making is however carried on to some extent, about 250,000 are said to be made annually.

St Thomas

The materials for brick making at St Thomas are said to be good, but few bricks are made there being little demand for them. —

Amherstburgh

Amherstburgh

The materials good and abundant and many bricks are made at this place, The same may be said of at Sandwich Windsor and Chatham

General Observations

The clay from which it is proposed to manufacture bricks in Canada should be dug some time before required for use and exposed as much as possible to atmospheric action especially during Winter.

It would be a great advantage to use a proportion of coal ashes in manufacturing bricks In London (England) not less than 720 bushels of coal ashes are used for 100,000 bricks and it should be well kneaded up with the clay, The absence of this material is the probable cause why the bricks are so unequal, being sometimes unusually hard, and at other times so absorbent as to crumble to pieces from the action.

action of the weather, foul ashes however are not easily procured in Canada, and are particularly scarce in the upper part of the Province.

Lime and Sand

Madawaska Little Falls

Lime cannot be procured nearer than Temiscouta; if any considerable quantity was required it might be burnt there but if only a small quantity was wanted it would be cheaper to get it from Riviere du Loup.

Sand is procured from a small island near the falls.

The Degeles

Lime must be procured from Temiscouta and Riviere du Loup. Sand from the immediate neighbourhood

Temiscouta

Lime

Lime can be burnt on the spot or
be procured from Riviere du Loup.
Sand from the Lake shore. -

Quebec

Lime can be obtained in any
quantity at Beauport from 4 to 6
miles distant on the north shore
below Quebec, it is of various quali-
ties. The lime from the Concessions
St^e Michael and St^e Thomas, is
that generally used by the Depart^{mt}.
-ment it is of very good discription
and much resembles the Dorking
lime of England. And sand is pro-
-curable in any quantity from
the River St^e Charles about 1 1/4
mile from the Citadel. -

Three Rivers

Lime and Sand can be obtained
at this Station without difficulty. -

Montreal

Lime can be procured here in
any

any quantity of excellent quality. The sand in this neighbourhood is bank and pit, but it is not fit for masonry or Brick work, it however from its soft-loamy character answers very well for plastering; the sand used for building at this place is brought from the South side of the St. Lawrence very little of good quality can be got on the north side near the City.—

Chambly

The lime required for this place has to be brought from Montreal; the only sand found here is very coarse river sand

St. Johns

The lime used at this station is brought from Lacadie and can be obtained in any quantity. The sand found there is bank
and

and pit, very coarse and lumpy

Laprairie

The lime used here is also brought from Lacadieu. Abundance of good river sand is to be had at this post.

Sorel

Lime can be obtained here in any quantity, and of a good quality. The sand of this place is too fine for Masonry or Brick work, but it answers very well for plastering mortar.

Ile aux Noix

The lime used here is brought from Lacadieu. River sand is procurable.

Coteau du Lac

Lime is to be had in any quantity from an Island opposite this Station. Very good river and pit sand is found
in

in the vicinity of this place. -

Rideau Canal from By-town
to the first Rapids.

The lime produced from the calcareous stone in the neighbourhood of these Stations is considered of a good quality, the quarries opened for the work of the Canal produced stone easily burnt: the mortar made from this lime takes a long time to harden, and is a very bad water cement. An excellent river sand is found about 4 miles from By-town in the bed of the river Gattineau a little below the rapids and first falls: a good quality of pit sand is also found near By-town. Generally speaking the land is of a sandy nature in the neighbourhood of the Canal stations and a tolerable good building sand can be obtained at these places. -

Kingston Mills
and
Brewers Mills

The

The stone at Kingston Mills makes excellent lime; the lime stone for Brewers Mills has to be brought from Ansleys mills and from the termination of the eastern ridge distance varying from $3\frac{1}{2}$ to 5 miles. A chrystalline lime stone is found at the upper mills but it is difficult to burn. it however forms a good white lime. —

Jones Falls

No lime stone is to be found in the vicinity; such as was required for the Canal lock was brought from Ansleys mills a distance of $2\frac{1}{2}$ miles land carriage and 18 miles water carriage.

Davis Mills Chaffey's Mills Isthmus and Narrows

The lime used in the construction of the works at these stations was made from a chrystalline lime stone which abounds at Chaffey's Mills, Davis Mills and on the shore of the
Mud

Mud Lake about half a mile west of the lock at the Isthmus.

Kingston Mills

Excellent sand is procured from a pit on the reserve at this place it is of different degrees of fineness, the coarsest being lowest and the raising of it much impeded by the water.

Brewers Lower Mills

At Brewers Lower Mills, the sand bank is in the wilderness about half a mile from the lock, it is of very indifferent quality being too fine and rather lumpy; there is no sand of good quality at Brewers Upper mills the sand required for the locks had to be brought from the shores of Dog-halee a distance of from 7 to 10 miles.

Jones Falls

The sand at Jones Falls is too fine for Masons work, that required in the construction of

of the canal was procured from the east shore of sand lake, the latter being being of an excellent quality.

Davis's Lock

The sand for Davis's lock was also procured from this place, sand is found in abundances at Chaffey's near the lock, and is of various qualities.

Isthmus

The sand pit at the Isthmus is about a quarter of a mile from the lock, and is of various qualities.

Narrows.

Good water washed sand may be procured in small quantity a little to the north of the lock

Kingston

Good lime similar to the chalk lime of England is easily obtained at this place, the best is made from the

The dark blue stone, the proportion commonly used for mortar are two parts of lime to one of sand. River and pit sand can be obtained here in any quantity, but the nearest place good river sand can be obtained at is Cotaraque Creek a distance of $3\frac{1}{2}$ miles.—

Toronto

No pure carbonic lime stone is to be got here, the lime stone used is generally obtained from Kingston a distance of 180 miles (water conveyance) it is burnt at Toronto; but may be brought from Queenston or Hamilton, both places being distant about 45 miles of which 42 miles has a water conveyance the other 3 miles being over land. Very good river sand can be got at Toronto in any quantity.—

Hamilton

Lime of a good quality is easily
procured

procured here, the quarries being but a short distance from the town; a very good sand for building is found on the edge of Burlington bay.—

Penetanguishene

Abundance of good lime made from stones found on the surface, or from the Island before alluded to (at a distance of six miles) can be obtained here; good cover, pit or bank sand can be got in any quantity.—

Niagara

Abundance of the best lime is to be had here, and very superior river sand.

Queenston

Good lime and sand can be got at this place in any quantity

Drummondville

Drummondville

Plenty of good lime can be procured at a short distance, and also bank and pit sand but good river sand has to be brought a distance of 3 miles.

Chippawa Lyon's Creek and Fort Erie

Good lime and river sand can be had at those places in great abundance.

London and St. Thomas

Lime and sand of a good quality can be procured at London as also at St. Thomas.

Amherstburg

Lime and sand can readily be procured at Amherstburg and of an excellent description

Sandwich

No.

No lime can be had nearer than
Amherstburg, excellent sand can
be obtained

Windsor

No lime can be procured nearer
than Amherstburg, good river
sand is to be had within 3 miles
of Windsor

Chatham

No lime can at present be pro-
-cured nearer than Amherstburg
good fit sand may be procu-
-red on the spot.

Plasterers Materials

Laths- can be readily procured in all parts of the country; they are made of Cedar or Pine the former is preferable, they are sold in bundles of 120 each at from nine pence to fifteen pence per bundle, Lath, nails are to be purchased at almost all the country stores, Hair, is to be had at any of the tan yards, which are to be met with in all parts of the country, it is sold at the rate at from three to four half pence per pound.

CementsQuebec

In 1837 experiments were tried on the black stone found at Quebec with the view of obtaining a cement, that obtained from this stone resembled the Harwich both in colour and properties; it set hard under water, but it proved not to stand exposure to the winter weather; it was very expensive in burning and grinding. It appears the Harwich cement remains hard in pointing but separates from the stone in winter. An oil cement proposed by Mr. Blacklock prepared as follows has stood the winter very well.

N^o 1 28 lbs of white lead, 28 lbs of fine sand dried and sifted, 28 lbs of stone dust dried and sifted, 1 lb of litherage, 1/4 gallon of boiled linseed oil, 1 day of a Mason and 1/2 day of a Labourer.

N^o 2. 28 lbs of fine sand dried and sifted.

sifted, 28 lbs of stone dust dried and sifted
1 1/2 gallon of boiled linseed oil, 1 lb of
litherages Labour as above.

The stone dust is prepared from the
spalls of the Masons shed and with
the sand must be quite free from mois-
-ture, the whole to be thoroughly incor-
-porated and beaten with a wooden
mallet till quite plastic, a small por-
-tion of either lamp black or ochre may
be added to make the cement the exact
colour of the stone.

Three Rivers

No natural cement is to be found here

Montreal

A stone has been found on the rising
ground about a mile north of this City
which when ground dry without being
calcined makes a water cement.

No natural cements have as yet been
discovered at the other stations in the
Montreal district.

Stations

Stations on the Rideau Canal

About $1\frac{1}{2}$ miles from By-town above the Chaudiere falls on the Ottawa River a quarry has been worked which produces a stone of a compact calcareous nature which when burnt and ground produces a cement that sets when mixed with one fourth sand. it however requires to be allowed time to set before water is brought into contact with it

Kingston

A cement is made at this station from a faded blue colour stone found above granite, it is burnt in a kiln like lime and ground in a mill; its quality is inferior to most of the water cements of England, it sets very slow and when used for pointing the joints of stone coping if it is rained on within 24 hours after being used it will entirely wash out of the joints, its efficiency in such work depends upon its being well troweled so as to present a glazed surface

surface. The proportions for use are
two of cement to one of washed sand.

Toronto, Hamilton, Penetanguishene
and Niagara.

No natural cement stone has as yet
been discovered at these places.

Queenston, Drummondville, Chippawa,
Fort Erie, London, St Thomas
Amherstburg, Sandwich Windsor
& Chatham.

No natural cement have as yet
been discovered at these places.

As it is considered that Asphalt may be with advantage used in this Country for covering the Arches of Magazines and casemates, as well as for other purposes the following memoranda, relative thereto, principally extracted from the observations on the Asphaltic Mastic of Peyssel published by F. W. Simms Civil Engineer and Surveyor in 1838, is circulated for general Information. _____

Asphalt

1. Is found in a mountain in the park of Tyrimont about 5 miles north of Peyssel, in the department de l'Ain in this immediate vicinity is also obtained a peculiar kind of mineral pitch, a species of bitumen, which, upon being mixed in the proportion of 7 of pitch to 93 of asphalt forms the mastic, or cement called Asphalt.

2. The process of converting the raw material into the mastic is as follows. The Asphalt is brought to the spot as it

it is extracted from the mine, ^{and} large misshapen masses averaging about a cubic foot in content, the bitumen is brought from Py-
-amont in casks and resembles mi-
-meral pitch of which it is a peculiar kind, the first process is to reduce the asphalt to powder, to facilitate which it is submitted to the oper-
-ation of roasting: this is done in a temporary furnace or oven, about 10 ft. long and 3 ft. broad; it consists of a trough about 10 inches deep the bottom being made of plate iron, the whole is set or formed into brick-work the asphalt is laid in the trough and a brisk fire made beneath the iron plate; a great evaporation takes place therefrom and the asphalt in about $\frac{1}{2}$ an hour falls or is readily reduced to powder; by this process the mass loses about two of its weight which evidently consisted of a aqueous matter. after roasting it is passed through
a

a sieve whose meshes are about $\frac{1}{4}$ of an inch square. and that which will not pass is reduced to powder by a heavy mallet. the process of melting is similar to that of Lead, into each melting furnace or cauldron, about 14 lbs of bitumen is first put, which, when dissolved, taking great care by stirring that it is not burned the powdered Asphalt is to be added gradually, to the extent of 186. pounds and when these have been well mixed, the whole composition must be suffered to get nearly liquid keeping it constantly stirred, that none of it may burn. otherwise it will be deteriorated in quantity; when this is nearly fluid which will be in about $1\frac{1}{2}$ hour, a bucket full of very small clean gravel is to be put into the mixture, this having first being made very hot. the whole compound is then to be kept stirred to mix it well, and as before to prevent its calcining, and when reduced

reduced to a proper consistency, that is when it begins to be in ebullition or to simmer and rather more fluid than treacle it is fit for use; at this period it gives out a light white smoke, From the furnace it is conveyed in buckets to the moulds, The above are the details of the process employed for the pavement at the Place de la Concorde and it is precisely the same where the material is employed for roofs of buildings or any other work except that in such cases the clear small gravel is omitted; the Mastic Cement should always be laid on a well levelled or sloped bed of Concrete &c

3. It requires a dry and level foundation to be prepared for it - concrete, powdered lime and Brick rubbish levelled and rammed, In the Floors of the Rooms a foundation was made of the old Bricks laid on the flat and the Asphalt was only laid $\frac{1}{2}$ inch thick but the thickness depends upon the hardship and wear it is to undergo, 1 inch would probably

be

be sufficient for the heaviest carriages and even for Gun. platforms. It is generally laid on in courses of about 2¹/₄ wide by nailing down on the foundation when it is prepared and the surface made level, two slips of wood of the thickness the asphalt is to be; it is then poured out of a ladle and levelled and spread by a straight edge run over the slips and another man sifts a little fine grit over and beats with a piece of wood; as it hardens another ladle full is then brought and poured out at the part where the last left off and spread as before when the breadth is completed the slips of wood are taken up and nailed down again as a guide for another breadth and thickness.

4. A few minutes after the mastic has been spread in a fluid state it again takes its natural density which is such that at the heat of 100° of Fahrenheit it resists all impressions from an ordinary force: it is antie-
-elastic has the appearance of Granite when

when set and is no way dangerous on account of fire, as it is not inflammable, the quantity of pitch it contains being so very small. When employed in the construction of Water Tanks or pederails it imparts neither taste, smell, or colour to the water it contains. - it possesses the durability of the hardest stone, and is wholly impervious to Water, it resists equally well, both heat and frost, it has been laid in the pavements of Stables in Paris and in 2½ years the horses feet had made no impression on it, many Artificial Asphalts have been attempted but the Geysel Asphalt Charidges patent is stated to be the only one that has answered.

5. Scale of prices for the Patent Asphalt of Sessel is furnished in England.

[illegible]

The following memorandum on the mode of applying the Bastenne Bitumen is from the Office of the Inspector General of Fortifications

The quantity of Bastenne Mineral Bitumen or Mastic required to cover 2076 superficial yards is about 35 Tons if laid half an inch in thickness this thickness is sufficient for foot pavements, Terraces, &c. and may also be sufficient, or at the outside $\frac{3}{4}$ inch for the proposed purpose of covering the Terreplein of the Redoubt at Point Henry, Kingston, provided it may not be necessary to move heavy Guns over it, from one part of the Redoubt to another in which case a thickness of $1\frac{1}{2}$ ⁱⁿ or $1\frac{1}{2}$ ⁱⁿ would be necessary.

The Bitumen should be laid on a substratum of concrete varying in thickness according to the nature of the soil or surface which it is proposed to cover; on a hard firm gravelly soil nothing more would be necessary than to loosen and form the surface to the required level or inclination and to mix with the loosened Material

(53)
a sufficient quantity of lime to
form a compact and conceivably
smooth surface; in a common earthy
soil a firm bed of concrete should be
laid 6 or 8 inches in depth, if the
ground is alluvial or marshy, it
may be necessary to go to the depth
of seven two or three feet with the
concrete. The surface being formed
for the reception of the bitumen, and
quite dry, rules of iron or hard wood made
to the thickness which it is proposed
to lay the material, and from three
to four inches in width are laid
on the concrete forming a square,
rectangular or other convenient figure
and which should not exceed an
area of from 20 to 30 square feet the
hot liquid bitumen is then poured
into the space enclosed by the rules,
and the surface brought to an uniform
thickness throughout and for which
the rules are a guide by means of
what is termed a "knife" used very
hot, a fine grit or powdered lime or
chalk should be sifted evenly over
the surface and dressed down with
a wooden bat, care been taken
to work towards the joints. when
the bitumen is sufficiently
firm

(54.)

from the rules are removed and three of them laid down to enclose a second area, the fourth side being bounded by the portion already laid, the hot bitumen is then laid in the second area, and finished off as before, described, the joints must be completed carefully, and if a complete junction is not at first made a small quantity of the material is poured into the interstices, and neatly smoothed off with the hot Knife.

As the work proceeds two sides of one of the small figures may be bounded by portions already laid, when of course two only of the rules will be required at last in a four sided figure.

The material is manufactured in blocks or cakes and when used required to be broken into pieces and melted in an iron pot, whilst heating it must be kept constantly stirred from the bottom to prevent its burning when it attains the consistency of thick treacle, it is fit for use and is then to be ladled out with hot ladles and laid on covered

A

A common cast iron boiler will serve the purpose of melting the material, which must be fitted with a moveable grate for the fuel, but it will be more convenient to have the description of pot used by the Bastone Company and they will supply at a cost of about £10. or £12, together with the few implements required, the pot must be as near as possible to the spot where the material is to be used, in order that it may not cool in the transit.

The price of the bitumen from the Bastone Comp^y and which is here considered the best, is prepared with a certain proportion of grit intermixed and packed in convenient packages for exportation £4.8.0. per ton.

Coke is commonly used for melting the bitumen but wood will answer the purpose.

Royal Engineer Office
London District
28th April 1841.

— Covering for Roofs. —

Slates, have been imported from England at moderate prices and in the few instances in which they have been tried they have answered; there are slate quarries in various parts of the Province - but they have not as yet been worked, at present roofs are seldom or ever framed of scantling that will enable them to bear the weight of slates. —

Tiles, - have been made in the brick yards but to no great extent; - the quality good; the price high.

Tin. - Is the usual covering for roof in the lower part of the Province, it is imported from England and procured at Quebec, Montreal, and the other principal towns in Canada, it lasts for many years, forms an excellent covering and is seldom in want of repair; - it is sold by the box, the price of a box of tin averages about 50¢ per box the quality is what called **I.C.** - one box will cover 108 superficial feet of roofing -
the

(57.)

The laying cost 5¢ per box including
5½ lbs of trimmed nails, the sheets
have a lap or cover of three inches

Shingles, are used throughout
Banada, and are every where
procured with facility they are
sold by the thousand; and are
made of Cedar or Pine, the former
are of the best quality a thousand
shingles will cover one square of
roofing the price is 8¢ per thousand
for Cedar and the same for Pine
the laying will cost 4¢ per thou-
sand including nails - Shingles
should have a lap or cover of
4 inches to the weather a good
workman should put on two
squares per day —

Carpenters Materials

Madawaska - Little Falls

Timber, in all the usual varieties of Canada is readily procurable in its rough state; but there are no saw mills nearer than the Great Falls a distance of 36 miles —

Degelt.

Timber, in its rough state can be procured here as at the Little Falls of the Madawaska the plank and deals must be sawn by the hand or brought from Riviere du Loup a distance of 52 miles; as with the exception of a short portage there is water communications between the Degelt and the Great Falls of the Saint John's - planks or deals might be procured cheaper from thence than from Riviere du Loup. —

Ippimisconata.

Timber can be procured as at the Madawaska and the Degele, the deals from Riviere du Loup a distance of 36 miles —

Riviere du Loup

There are saw mills at this village. timber and boards are plentiful. —

Quebec

Timber and deals may be procured here in great abundance. —

Three Rivers

The same remark applies to Three Rivers.

Lovel

(100.)

Gorel

It is reported that cedar and Hemlock are abundant but of small scantling and that there are no saw-mills in the immediate neighbourhood

Montreal

Timber and deals are always readily procured, of any scantling or description

Shamby

Timber is scarce but boards of all descriptions are abundant

Saint John's

Cedar & Hemlock timber is plentiful, but as sawn into scantlings, not so. - boards are reported to be scarce

Isle aux Noix

Timber and boards may be had from the neighbourhood

(61.)

Lac - Paire

Timber and plank
must be brought from Montreal

Porteau du Lac

At the steam boat landing
timber, planks, and boards, can
be procured in any quantity

Line of the Rideau

There are numerous
saw mills at By Town, Kingston
mills, and other sites on the line
of the canal —

Timber in any quantity
and of the best quality can be
procured at the bay where it
is collected for the timber merch-
=ants or from the rafts; the timber
most generally used for building
both internally and externally
is the red and white pine, it
is easily wrought, and if kept
painted is durable; the red is
the strongest, but not so generally
used.

(62.)

used as the white, as it is found to warp, and the gum exudes from it when exposed to summer or stove heat - Cedar is used in all situations exposed to the weather, or damp, Ash, & Elm, for framing in out buildings handled for tools - &c -

Oak is of three varieties white, red, and black; - the white is of good quality and used in machinery & wheelers work also for door jambs lintels and other purposes where strength and durability are required. - The red oak is little used for building purposes but is manufactured into staves for the West India merchant. - The black oak, stands well under water. - Birch is little used except for hand rails and balusters of stair cases. - Beech is nearly used in buildings it is very susceptible of dry rot. - Elmlock is well calculated for piles or planking when used under water. - Tamarack furnished excellent scaffolding poles.

Kingston.

As from its proximity to the Rideau being only 6 miles from Kingston mills is well supplied with timber and boards; - there are also very extensive saw-mills at Gananoqui 24 miles below Kingston on the Saint Lawrence from which Brockville, Prescott, and Cornwall are readily supplied

Toronto.

Timber and boards of good quality can be obtained in any quantity required

Hamilton

There is no difficulty in obtaining supplies of timber or boards at this station

Pemiganquishere

The oak is reported good but the pine of inferior quality —

(64.)

Niagara

No difficulty exists at this station in procuring timber and deals, for building purposes

Queensdown

The same may be said of Queensdown, - at Drummondville it is reported the supply of timber is sometimes deficient, but it may always be procured at an additional expence for conveyance from other points. -

Chippawa & Fort Erie

The same may be said of Chippawa & Fort Erie,

London

At this station oak and pine may be procured in any quantity likely to be required & almost of any scantling

Saint Thomas

The same may be said of
Saint Thomas —

Amherstburg

Pine and boards cannot be procured near this place the general supply comes from the Black river mills at the head of the Saint Clair river in the state of Michigan, or from Otto Creek a distance of 150 miles on the shores of Lake Erie.

Sandwich & Windsor

The same difficulty exists with respect to procuring pine at these stations, as at Amherstburg but oak and black walnut may be obtained at all three stations —

Chatham

The same description of wood as that obtained at Amherstburg and the neighbouring

(66)

stations can be obtained here at an equal price, except pine timber which is of course dearer; as it must come from the Lake or from the United States. —

Ironmongery

can be procured at Quebec, Montreal, Kingston, Toronto, and at all the towns in Canada, but generally of an inferior description, — Particulars. locks, hinges and latches, — There are very good iron foundries at Quebec, Three Rivers, Montreal, Kingston, Toronto, Niagara, Long Point, London, St. Thomas, Wood-hull mills on the River Thames and Woolbourn furnaces near Ayrshire. — at most of those places castings of any kind can be procured. —

(67.)

Glaziers Work.

Glass is imported from Great Britain cut into different sizes and packed in cases it is very seldom brought into this country in crates. — That mostly used in the country is the C.-glass a box of glass contains 50 superficial feet but sometimes the box has 100 feet in it and is sold according to the size of the pane; the price per pane, varying from two pence to one Shilling and two pence. — it can be procured at all large towns no glass is imported from the United States. —

Painters Work.

Paints, oils, and all the requisites for painters work are imported from Great Britain and may be procured at all the principal places in the Province —

Plumbers Work.

Is generally not well performed the materials are imported from Great Britain sheet lead is very dear the price at Montreal being from 55/- to 60/- Shillings per cwt wt.

Plumbers work is not much used in Canada:— The great range of temperature been detrimental to sheet lead when exposed to it.— Pumps are not generally used in consequence of the Frosts —————

General Observations upon building in the Canadas

The season for work may be said to commence in May and to close in October; except under peculiar circumstances masonry should not be carried on at a later season. The following is an account of an experiment tried at Quebec in the winter of 1826. —

" A square brick column was constructed on a stone foundation in the Engineer yard during a temperature of 15° degrees below zero, it was 18 inches square and 8 feet high, and built of English grey stock bricks, the mortar was prepared with hot water and the trowels kept constantly warm, the bricks were also warmed with a view of allowing some time for them to adhere to the mortar before freezing the joints were pointed in the best manner; it was allowed to stand for two years, and as the pointing appeared good it was supposed the

(70.)

the work was also. - but on trying its strength it fell with a very slight pressure and the inside mortar was found in a pulverized state not adhering to the bricks, which were uninjured

By subsequent experiments it has been found that building cannot be depended on at a later period than the 15th Nov. - pointing done after September has generally to be renewed in the following spring. Brick chimneys which were built in the winter of 1837. are in 1841. in a state of ruin. -

At Montreal however the brick cook house in rear of the temporary Barrack in the Quebec gate square, was commenced in October 1837. - it was only 14 days building. dry frosty weather the whole time so that the mortar which was made with boiling water froze quite dry nearly as fast as used
The

(71.)

The Artillery Stables were commenced Building 22nd Nov^r 1837 and the brick work was finished in January 1838. severe frost had to be contended with; the mortar was boiled and set hard as soon as used. - The men principally worked with mitts on their hands. - so that the bricks are not very neatly laid and when once placed in their position could not be readily moved - the work has stood well and the walls do not appear to be affected by the weather. -

Timber can be procured very cheap and without any difficulty in almost every part of Canada, but on account of the great expense of sawing, scantlings are often used of a size and in a way that, would not bear the test of scientific reasoning. - On the Rideau canal it is the practice to
give

(72)

give the owner of a saw mill
half the timber for cutting it

In many parts of Canada
it is usual for the person who
employs artificers and labourers
to board them —

Timber from 18" to 24" inches
square is generally found to be
the most sound and convertible.
the concentric rings shown on the
ends of such timber have frequently
been counted and have been found
to average from 100 on the smaller
to 125 on the larger dimensions,
which being allowed to be the
respective ages of the timber
will give that period as the best
for cutting. the growth will of vary
course vary with the nature of the
soil that grown on high lands
has the smallest rings and is conse-
-quently the strongest these remarks
apply to pine timber. hard wood (say
-oak) would at least double
the above ages. - the most favorable
time with lumber men for cutting
timber is from 1st Nov. to the 31st Dec.

(73.)

the sap at that period being
quite down —

The contract system
as adopted in England, has
been tried at Montreal, Kingston,
and other places and there is
every reason to hope that the
attempt will be ultimately
successful. although it cannot
be expected to work well at
its first commencement. —
much of the work on the
frontier performed in conse-
=quence of the revolt was cont=
=acted for by Americans. —

(74)

Materials for Roads
and Canals with some gen-
eral observations on Road
making. —

District below Quebec

From Quebec to Riviere
du Loup in bas., the road is
good and material abundant;
across the Portage to Immisconata,
the road is not good, but materi-
als are at hand for either
macadamized, plank timber
or Corduroy road; — the same
may be said on the Madawaska
and Saint John's to the limits
of Canada. —

Quebec.

Materials for road making
abound in this neighbourhood,
but as yet little use has been
made of them the common
black stone is the material

(75.)

generally employed by the city authorities but it is quite unfit for making roads of a permanent kind. - Granite could be obtained in any quantity but it is seldom made use of - an excellent gravel for pavements is to be had about two miles from the city, but the great distance it has to be drawn renders the using of it very expensive; it is not fit for public roads. —

Three Rivers

This is generally a sandy soil and the roads in the neighbourhood are good. —

Yorik

The soil is sand, and stone is very scarce. —

Montreal

There is an abundance of materials for making roads &

(76)

and parades in front of the neighbourhood of this city; the lime stone however which is the prevailing stone at this place very soon pulverizes: there is a hard dark stone found near Long Point which it is thought would answer better for road making but its distance from Montreal is a great bar to its general use. The island of St. Helens produces excellent stone for macadamizing; the slate, rock and gravel found there makes a capital parade. —

Chamblay

There is a slate gravel found here which is an excellent material for parades. — The stone found in quarries is well adapted for making roads. —

Saint John

This place abounds with water washed pebbles which when broken make an excellent material —

(77.)
material for roads but it is
very expensive —

La Prairie

There are excellent materials for roads and parades in this vicinity —

Notre-Dame du Lac

There is abundance of materials for forming roads and parades here —

Line of the Ottawa Canal

Stone and gravel well calculated for road making are readily procured —

Line of the Rideau Canal

By Town. Cartwells. Beag-
back Black Rapids Long
Island, —

Excellent materials for roads and parades can be —

(78.)

be procured in the neighbourhood of these places, the surface of the lime stone rock being exposed to the weather for ages, detached itself into small pieces of which a large quantity is to be found in the bed of the river below the dam and near By Town —

Barrets, Nicholsons, Clows
Merricks, Maithamels, Edmunds
Old Phys. Smiths falls. First
Rapids —————

Sand is generally used at these stations for repairing the roads, but excellent lime stone road metal can be procured at each of them —————

Kingston Mills

The limestone quarries at this place would afford abundance of stone for Macadamizing but no gravel is procurable, — shale and quarry rubble, have with

(79)

difficulty been procured to crown
the tops of the locks. —

Mewers lower Mills

There is no gravel at this
place —

Mewers upper Mill.

A bank of disintegrated
quartz and feldspar mixed with
earth is found at the distance
of a few hundred yards from the
locks at this place; the sand
stone before mentioned could
also be made use of if required.

Sone's Falls

There is a good gravel to
be obtained at this place but
it is failing in quantity, much
of it having been used to form
the dam &c. —

Davis, Chaffey's. Ist. & 2nd.

Disintegrated feldspar and

(80.)

and crystalline limestone is obtainable at these places

Narrows,

The debris of the sand stone is used for making roads at this place —

Cornwall. Prescott. Brockville, Ganouagui, and Districts behind the Saint Lawrence and the Rideau —

The soil is a stiff clay with boulders and some sand on the road towards Dickenson's landing

The soil is sandy towards Ganouagui and the road passes over granite rock 32 miles to Kimberville —

Kingston

Both granite and lime stone can be procured for road making at this place; the lime stone

however is the material generally used for this purpose; it is imagined that lime stone broken very small mixed with the refuse of wood ashes and lime taken from the pot ash manufactories form good foot ways or parades not subject to be cut up by horses, carts. &c.

Toronto.

The materials procurable for making parades and roads, are, rather scanty, at this place, there being no stone for breaking but the granite boulders before spoken of. Shingle and gravel can be obtained along the beach near the Garrison and for some distance beyond it but both are of an inferior quality the action of the rain and frost in a few years moulders them into a substance little better than clay.

Three miles out of Toronto in the direction of Kingston there is ten miles of boarded road, 16 ft. wide of 3 inch plank laid across the road upon longitudinal sleepers which are four feet from centre to centre and 5 x 6 inches scantling, the road is levelled

(82.)

and the sleepers sunk to form a good solid foundation; the planks are spiked with spikes 6 inches long one at each end and covered with about two inches of sand to lessen the wear. The expense of planking, the road being previously formed including all materials is said to have been about £525. per mile it will probably last ten years during which period the repair may probably average £50. per annum as for the five first and two last years of the ten little will be required —

Hamilton

Materials for Macadamizing can be readily procured, but not gravel; the macadamized road near Hamilton on the route to London is reported to have cost nearly £3.000 per mile —

Pometanguishene

The only road making materials at this place are granite boulders. —

(83.)

Niagara

Plenty of small hard grey pebbles from 2. to 9. inches diameter are found in the neighbourhood, which when broken make good roads and parades, there is also abundance of the best lake gravel to be had. —

Queenston

Broken sand stone & granite pebbles may be obtained there as well as good pit gravel all of which are well adapted for forming roads, parades. &c. —

Drummondville

Broken quarry stones and field granite pebbles are to be had in this vicinity for forming roads and parades. —

Whippawa and Lyons Creek

Materials for forming roads and parades at these places cannot be procured nearer than Drummondville —

Sat. Ore.

Broken stone and pit gravel is found in abundance here, which would make good roads & Parades

London

Gravel at this place is expensive having to be taken from the bed of the river, which is one mile distant from the Barracks —

Saint Thomas

Gravel and shingle calculated for road making are reported to be found at St. Thomas.

Amherstburg

Within a distance of 15 miles excellent gravel for forming Parades may

185.
may be procured —

Sandwich

It is reported that no good materials for road making are to be found in the neighbourhood of Sandwich —

Windsor and Chatham

The remark upon Sandwich is applicable to Windsor and also to Chatham —

1861

General Observations on Roads

Roads should, whenever it is practicable be carried on a level; for a longer distance on a tolerably level surface will require less animal strength than a shorter line passing over considerable elevations.

In the formation of the road the ground should be carefully levelled; pickets put in at every hundred feet, and sections taken as a requisite precaution to prevent unnecessary excavations or embankments. The perfect draining of the road is an object of primary importance; without this precaution it is impossible to have a good sound road.

Roads in
swampy ground
are frequently

Made by layers of young
straight trees, it is in Canada a frequent practice
4" to 8" or 10" in
diam^r close to use loose brushwood. This is
together in a wrong. The brushwood should be
direction to the made into fascines or bays and
line of road.
such roads are
called "corduroy". - two good axemen will make from 15 to 24 feet broad

of such road
in a day, as
the place where
the trees are
cut is near
to or distant from
the road. The

(87.)

material for
those roads in
thin layers, each
layer having
generally cost
nothing, and
the wages of
the men are
from $2\frac{1}{2}$ to $3\frac{1}{2}$
cunning per
day.

start the drivers through the centre to
Keep them from

The metal should be put on
in thin layers, each layer having
generally cost time to be well settled before the
nothing, and next was laid down. the first should
be about five inches; - if the width
of the road does not exceed 16 feet,
and the traffic is not very heavy,
a second layer of five inches will be
sufficient, - but should the road

The expense be broader than 16 feet, or the traffic
of turning be great, ^{more} two layers of four inches
macadamized, each will be necessary. -

roads, confines
them to the
towns or the
trunk roads
in their im-
mediate
vicinity.

If the width of the road is
16 feet the rise in the centre above
that of the sides should be $2\frac{1}{2}$ inches
and in this proportion for roads of
a greater or less breadth. -

The usual
method of
opening new
roads, where
the settlers are
limited to
their own
resources, is
to cut down
the trees, so as
to form an
opening, from
ten to fifteen
feet wide,
and leave the
stumps for four or five years, when they can be more easily taken

Covering the surface of the
road with sand, gravel or other
loose materials prevents the angles
of the stones from combining and
caused the road to be hollow underneath

The price of stone for the maca-
damized road, varies according to
the description of materials and the
facility with which it is procured;
when granite boulders are abundant
and
stumps for four or five years, when they can be more easily taken

out in forming
the road, the
nature of the
ground is

(88)

and at no great distance, they
studied runs are laid out the side of the road
than the direct for about 50% on an average the
line, going to side of 2 1/6 feet the sides will
round hills & swamps rather weigh from 8 to 10 tons, the cost
than over them of breaking the boulders is from
Twenty men 130¢ to 36¢ per ton - Some stone may
with axes would be quarried at from 5¢ to 7¢ broken
make a mile for - 18¢ and laid on the road for
of such a road about 5¢ the side —

in a day and
it would be
passable for
oxen or sure
footed horses
with strong
vehicles. It
is commonly
called a "Bush
road".

When the road
becomes es-
tablished by
law ("Road
book") the
direction is
straightened
the road wi-
dened, the
stumps taken
out, and ditches
dug at each
side. The
cost of the
road when
finished in
this manner

40 feet in width

and the center

raised with

the excavation from the ditches, and poured, averages

about £200 per mile, but to open such a road at once through

wild land would cost £300, per mile, exclusive of bridges and

A good hand will
earn from 7 1/6 to 10¢ per diem
an indifferent one not more
than 2 1/6 per diem by breaking
stones. —

Granite should be broken
to 1 1/2" in in diameter, sand or
lime stone about 2 1/2" inches —

The best macadamized
roads are said to be made of three
parts granite and one part lime
or sand stone —

A macadamized road
16 feet wide with a two thickness
of metal will require about 330
tonnes of broken stone 2 1/6 feet to the
side —

The cost of ditching drain
ing forming the abutments,

with

the excavation from the ditches, and poured, averages

(89.)

with making the bed for the reception of the metal may under ordinary circumstances be calculated at £400 per mile; - this does not provide for lowering hills; building bridges or cutting large lateral drains, which expense must of course vary greatly as to circumstances but in a distance of 20 miles may perhaps be averaged at £200 per mile. Thus we have an expense of say £600 per mile before we commence to put on the metal for which say 59/- per ton broken and laid on we may add £1155, making a total of £1755 per mile. —

The labour of one man will keep in order three miles of a well drained and well made road paying constant attention to putting the loose stones into the rut, sweeping mud from the road opening water communication &c.

Turnpike roads as adopted in Russia have not been tried in Canada; there is little doubt but that they would answer equally well;

and cutting down hills or slopes of ravines. These roads constantly require repair, the expense of which it is difficult (from the way in which the repairs are made) to ascertain. Every farmer in Canada keeps "his own road" or that which crosses the

front of his
land in good
order or is
supposed to
do so and
as from the
varied na-
-ture of the
ground the
labor falls
very heavy
on some &
light on
others, the
average cost
cannot be
very correctly
ascertained.

(90)

trees of either pine, elm, oak,
chestnut, cedar, or black ash, should
be felled and roughly squared and
sawn down the middle the reverse
way thus giving two half trees of
very heavy and required being the or dimensions
light on, which being laid with the sawn
others, the side supports most to form the surface
average cost of the road: these half trees are
very correctly nailed to sleepers buried in
the earth or soil forming the founda-
-tion of the road - a mortice
less than should be cut in the ends of the
180 or 200 sleepers to admit the driving of
a strong wedge to firm the timbers
which form the road together,
besides the the half trees to keep them steady
renewals and thus form the whole in a
of bridges solid mass. -

performed
by the farmers
collecting
on a day
appointed a road of this description would
and put - not it is believed cost more than
-ting all
the bridges a plank road & would be made
on their much more readily in a new coun-
-try where saw mills are not
found in
repair, established
an operation

The sleepers are of course
laid the reverse way to the trees -
appointed a road of this description would
and put - not it is believed cost more than
-ting all
the bridges a plank road & would be made
on their much more readily in a new coun-
-try where saw mills are not
found in
repair, established
an operation

which is, in many parts, such a troublesome and expensive
one that (as an instance) it may be mentioned that in the
signory of Canhamois some bridges across deep ravines near

the river
Saint Louis
which had
cost about
£3000, (in all)
were taken
down, the
farmers
preferring
to descend
and ascend
very steep
hills at
each of the
ravines, to
spending
12 or 14 days
every season
endeavouring
to keep the
bridges in
good order.

The original cost of a plank
or timber road will be about
one half less than that of a mac-
adamized road, the repairs
will be greater but in a period
of ten years the expense of a plank
or timber road will be about one
third less. - They are less noisy, dusty
and muddy than macadamized
road, cause less wear to the tire of
wheels, and shoes of horses, are
much less injurious to the horses
feet, the carriages are also
drawn with less labour to the
animal, they may be formed
of plank or timber of not much
value for other purposes. can be
rapidly made and the materials
are always at hand —

The calculation for keeping in
repair the turnpike roads throughout
England is £50. 18. 8½ per mile; - a
calculation I have seen for Canada
gives £50. 17. 6. for macadamized
roads, & plank roads £70. 10. taken
at an annual average for a
period of eight years —

Memorandum upon Artificers and other Tools

Broad & Narrow Axes. Adzes. Hammes
Dress Knives and generally all Coopers
and Wheelwrights Tools of the like de-
scription being of American man-
ufacture, the former bear a much
higher price, never less than 100. per
cent. and from being made of the
best cast steel, certainly are more
effective. The workmanship is hand-
somer and the make of the Tools
better adapted for the work required
here, many of our Hardware mer-
chants say that English workmen
will make work to the patterns sent
home, but make some slight alter-
ations which destroy the Sale of the
tools there is likewise a predilection
for articles which are forged in
Charcoal, altho it is believed, that
all Tools made either in Canada
or the United States are made of
English Steel.

The workmen in Canada
take a pride in the beauty of their
Tools, and from earning such high
wages are able to pay a greater price

1931

than men of a similar class in England. Mr. Harris our principal Hardware merchant in Toronto, has given the following information on the subject.

Chopping Axes, if as good an article of chopping axes could be made in England, as is manufactured in the States & Canada and at a lower rate, the consumption would be immense and increase every year the retail price of a chopping axe is 10/- 6/- without the handle.

Scythes an american improvement has lately been made in scythes but the price is 25 per cent higher in consequence. and altho' the quality is better, yet from the long established character of "Moses" and "Wiggins" scythes they are only making slow head against them; were the prices equal it is believed the american would have greatly the preference —

Draw Knives of American manufacture fetch a higher price by 100 per cent than those of English make a canadian or american cutler charges from 1/- 9/- to 1/- 6/- per inch

for them and from the quantity required for shingle making and for other works of a similar description there is a great demand.

Hammers, with handles; those used by carpenters here are usually of American manufacture. Those of English manufacture of a similar pattern, sell at $2\frac{1}{2}$ to 3s each, whilst the American sell readily at from $\frac{2}{3}$ to $\frac{7}{6}$ each. The American article is made entirely of steel and beautifully finished - a merchant here sells 6 of American for 1 English hammer.

Broad Axes, with handles, for hewing timber, cost here retail from 20s to 25s shillings they are all of American manufacture —

Coopers & Carpenters adzes, with handles of the same manufacture, are from 2 to 300 per cent dearer than the English and have a ready sale.

Mill saws, the English are entirely out of the market. The American sell at from 20 to 30 per cent higher than could ever be obtained for the English saws —

(95.)

Planes notwithstanding the English wood is better than the American yet the American planes with English Irons or blades are almost universally preferred they are better finished and of a handier manufacture.

Brads & Nails. The cut brads and cut nails of American manufacture have completely superseded those of England. Mr. Harris imports no English cut Brads or Nails. The accompanying samples will show American manufactured products side by side in Canada. The prices wholesale are for.

60 lb cut Nails full count — 6 pence.
14 lb — ditto — 6½ pence

The Nails vary in size from 2½ to 20 lb. to the thousand — 0
1½ in. fine Blue cut Brads 7½
1¼ " — ditto — 5
1 " — ditto — 4¾
¾ " — ditto — 4¼

Brads will not full count, out
Nails — do.

Spades & Shovels of American manufacture are preferred from

(96.)

Their superior quality, to those of English manufacture notwithstanding the difference in the price English spades being sold at $\frac{3}{4}$ to 1 of each retail whilst American can bring from 7/- to 10/- each.

A respectable storekeeper at Toronto sells from 6 to 8 Doz: American spades annually and the sale is increasing rapidly. Some idea of the consumption of chopping axes in Canada may be formed from the fact that the same person sells from 100. to 300. dozen per annum every pretty store in the country has them for sale, besides very many are made by the blacksmiths on the spot. A thousand dozen would be a very low estimate for the annual consumption in Upper Canada.

Louise the Rebel who was a mere ordinary blacksmith residing near Lake Simcoe, has made and sold 500 axes in the course of one year, all by retail and taken from his smithy by the country people. — To reduce Halifax currency to Sterling divide by Six. —

(97.)

Memoranda on the wages of workmen in Canada

Wages of workmen per day in Hal. Currency									
Stations	Masons	W. Lagers	Carpenters	Shinglers	Plasterers	Painters	Stumblers	Smiths	Labourers hired & cart.
Quebec District	6/-	6/-	5/-	4/6	6/-	6/-	8/-	5/-	2/6 0/-
Montreal - do -	6/-	6/-	6/-	4/-	6/-	6/-	8/-	6/-	2/6 6/6
By Town - do -	6/9	6/9	6/-	4/6	7/6	6/3	12/-	6/6	3/3 7/6
Kingston Mills -	7/6	7/6	6/-	5/6	7/6	7/-	12/-	6/-	3/6 6/-
Kingston -	8/4	8/6	6/-	5/-	8/6	6/3	4/-	6/6	4/2 6/-
Toronto -	7/6	8/-	6/3	5/-	8/6	6/3	4/3	6/6	3/9 7/6
London -									
Chatham -									
Amherstburg -	7/6	8/-	6/3	5/-	8/6	6/3	4/-	7/6	3/9 7/6
Windsor -									
Sandwich -									
Niagara Frontier	6/3	7/6	6/3	5/-	8/-	6/3	4/-	7/6	3/6 7/6

The wages set down in the above table are those given to the best workmen.

(198.)

Inferior workmen can be obtained at Quebec & Kingston, and sometimes at the other stations for lower rates of wages than those stated in the above table. On the Rideau Canal it is often difficult to obtain labour at any price and generally speaking a less rate of pay is given to workmen when employed in the winter than is paid to them during the summer months, and in most places in Canada Artificers and Labourers are rated under three different classes the wages decreasing from the 1st class. It will be perceived that the wages of workmen of the same class vary very much at different stations for instance a first class labourer at Quebec gets $2\frac{1}{2}$ a day where at Kingston he would have 4s. —

(99.)

Memorandum of the prices of Building Materials in Canada

Description of Articles		Durham	Montreal	B. Town	Kingston	Toronto	
Bricks - Building stones delivered rough at the spot	Soap Ponce ashles	9 $\frac{1}{2}$	"	"	"	"	per foot cube
	Print and Ironblades	1.3 $\frac{1}{2}$	"	"	"	"	
	Large Garden Arch	75.0	"	"	"	"	
	- do - do - smalls	50.0	"	"	"	"	per Side
	Soap Ponce Rubble	50.0	"	"	"	"	per 2 1/2 Cubic feet
	Limestone ashles	"	8	"	5	"	per foot cube
	- do for rubble	"	25.0	20.0	16.8	"	per Side
	- do coursed work	"	"	"	31.0	"	- do -
	Lake stones rubble	"	"	"	"	50.0	- do -
	Boulders - do -	"	"	"	"	40.0	- do -
Bricks - Building stones delivered rough at the spot	Queensdown do -	"	"	"	"	80.0	- do -
	- do - ashles -	"	"	"	"	2.6	per foot cube
	English grey stocks	100.0	"	"	"	"	per 1000
	- do - red - do -	50.0	"	"	"	"	- do -
	Canadian place	35.4	30.0	"	"	"	- do -
	Fire	160.0	"	"	"	"	- do -
	Toronto Stock -	"	"	"	"	32.0	- do -
	do common -	"	"	"	"	25.0	- do -
	Rough Lime -	5 $\frac{1}{2}$	0.10	0.9	0.7 $\frac{1}{2}$	1.4	per Bushel
	River Sand -	0-1 $\frac{1}{2}$	0-2 $\frac{1}{2}$	0-1	0.2 $\frac{1}{2}$	0.1 $\frac{1}{2}$	- do -
Castings of all kinds -		-3	-3	-3	3 $\frac{1}{2}$	0-4 $\frac{1}{2}$	per lbs
cont:							

Memoranda (Continued)

Description of Articles	Quebec	Montreal	Wg. Town	Kingston	Poronto	
Oak best square	2.6	1.6	1.5	1.6	0.9	per ft. Cubic
Oak grey - do -	1.3	"	"	"	"	- do -
Pine, red - do -	0.10	0.10	0.8 $\frac{1}{2}$	0.8 $\frac{1}{2}$	0.8	- do -
Pine white do -	0.6	0.6	0.4 $\frac{1}{2}$	0.4 $\frac{1}{2}$	0.2 $\frac{1}{2}$	- do -
Ash - round -	0.8	0.10	0.5	0.4 $\frac{1}{2}$	0.4	- do -
Cedar - do -	0.5	0.5	0.4 $\frac{1}{2}$	0.4 $\frac{1}{2}$	0.5	- do -
Elm - do -	0.8	0.7 $\frac{1}{2}$	0.6	"	"	- do -
Sawing Oak -	from 7.6	"	"	"	10.0	per 100 ft. Sup ^{ts}
Sawing Pine -	from 3.9	"	"	"	6.3	- do -
Cedar Shingles	from 6.9	7.6	"	"	"	per 1000
Pine - do -	from 7.0	8.3	"	"	"	- do -
Pine I.C. -	from 50¢	"	"	"	60¢	per Box 225 sh ^{ts}
Oak best Newcastle	from 45¢	"	"	"	65¢	per Cwt 175 Sup ^{ts}
Good Street, milled	from 35¢	"	"	"	55¢	per Cwt. 4 $\frac{1}{2}$

