12-05-2012

(1) Materials

Properties, usage, manufacturing, etc ... of

- Bricks / Blocks
- Sand [as F.A]
- Cement
- Lime

] as binding material

- ~~Water~~ Morter [~~as~~ Paste of F.A + cement + water]

Concrete — f(C.A + F.A + cement + water)

Timber —

Plastic —

C.A — brick chips

Stone chips

Binding materials — cement — C.C.

Lime — L.C

cement + Rod — R.C.C

Morter — cement Morter (By default)

Lime "

Mud "

Every binding material on drying shrinks.

~~Flexural~~ Shrinkage Reinforcement use করতে হবে।

Brick chips — Not durable

strength — durability
— economy (utility বাড়াতে হবে)

যে জায়গায় water সংস্পর্শে আসে সেখানে brick chips isn't used.

structural element — slab
↓
— Beam
↓
— column
↓
— Footing (Pile)
↓
soil

soil → cohesive soil (আঠাল) — bonding force আছে particle এর মধ্যে (0.074 mm)
→ cohesionless soil (Individual particles are separated)

BOOK — Building Materials — Gurucharan Singh

19-05-2012

(2)

Material

IKRamul

Bricks

i) Regular sized Rectangular unit

ii)

Ingrediants

i) silica → 55%
ii) Al_2O_3 → 30% } main
iii) Lime → 7% }

iv) Fe_2O_3 8(%) v) MgO 5(%) vi) organic matter 1%.
(periferal) (Not harmful if in this Range)

Functions of chief Ingredients

Alumina:

- main constituents of clay
- provides plasticity (cementing property) to earth so that it can be moulded
- If it contains excess amount, brick shrink, crack & warp on drying & Burning.

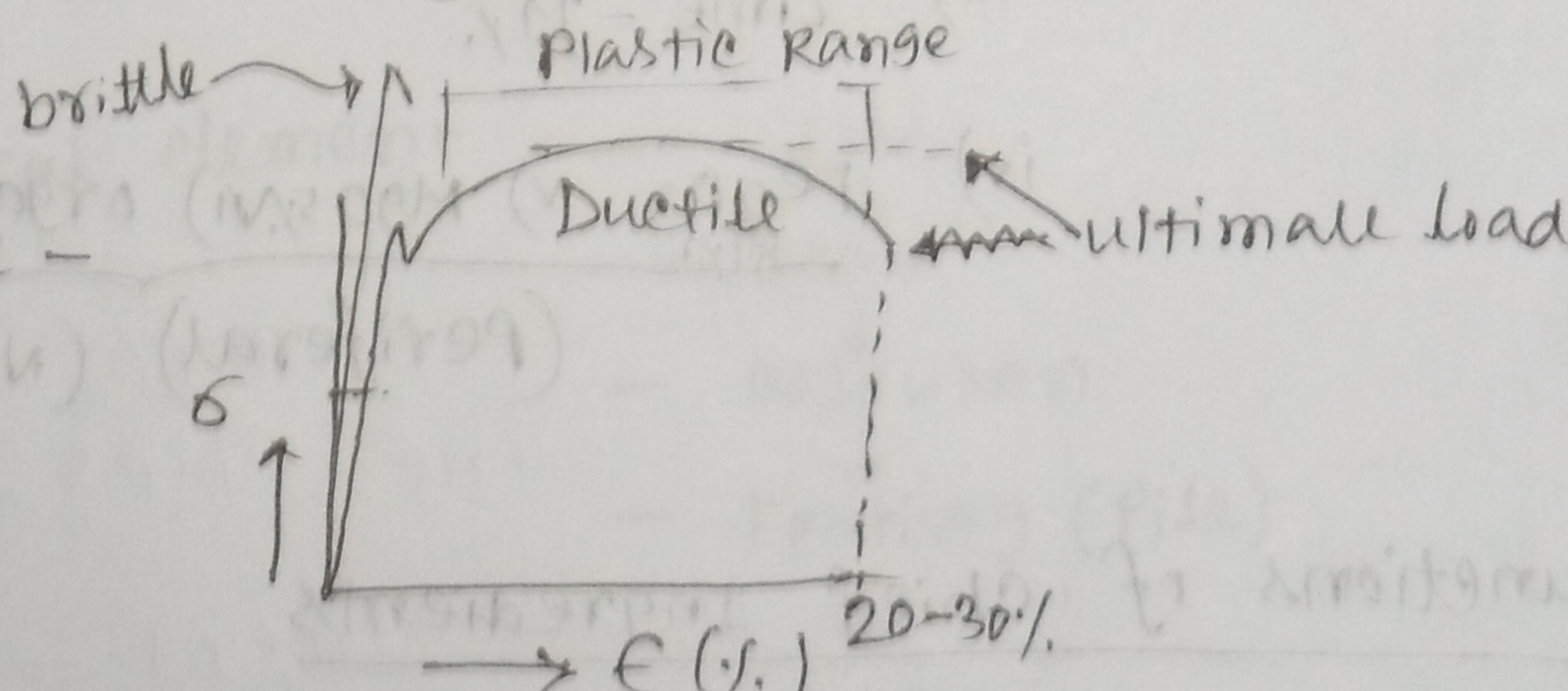
shrinkage & temperature Reinforcement (0.0002%)

Silica:

- good bricks contains 50-60%.
- Prevents cracking, shrinking & warring (shape distortion)
- excess amount destroys cohesion & makes brittle & weak.

⊞ Durability of bricks depends largely on proper proportioning of Alumina & silica

⊞ Brittle - Ductile Behaviour



Ductile Material use করা হয় sufficient warhing দেয়।

Lime

Lime use করলে কম silica melt হয়
বেশী silica melt করলে - highly cementitious
তাই 1% Lime use করতে হবে।

Iron oxide: Red colour brick

MgO: Yellow আভা

Harmful Ingredients:

Lime, Alkalies

$CaCO_3$ (95%) → Lime $\xrightarrow[\text{Heat CaO (>95\%)}]{\text{Air } CO_2 \uparrow}$ Quick lime (very strong Affinity to water)

$CaO + H_2O \longrightarrow Ca(OH)_2$ (vigorous Reaction)
(Slaking)

Quick lime + water
- i) volumetric expansion
- ii) Heat generate
- iii) sound generate

After slaking — fat lime. (চুন শোনানো)
(hissing sound)

ASTM D2150 - 1993
BDS 208 - 2002
size - 24 cm x 11.5 cm x 7 cm

s Grade A-Grade — B-Grade
(<10%) <(15%). <(20%)
Absorption capacity)

#				
	crushing strength	280	175	140
	Mean strength (Kg/cm²)	245	154	105

Min^m strength

cementic materials
Raw brick - Alumina
f " - lime

(3) EKRAM SIR | 26-05-2012

Manufacture & preprapration of bricks & clay:

02/06/12 — Bricks

(4)

Source of sand: — Pit sand:

- obtained by forming pits into the soil
- It is sharp, angular porous and free from harmful salts.
- clay & other impurities should be washed and screened before in using engineering purpose.
- Fine pit sand when rubbed between finger, should not leave any stain on it. It indicates the presence of clay.
- used for mortars.

River Sand;

		FM
(F) Fine sand	—	0.1 ~ 0.5
(M) median "	—	0.8 ~ 1.25
(c) Coarse "	—	2.7 ~ 2.9

Grouting

50% of sand

stone screening (- # 4 sieve) 1 cft / 125 Tk

Sea sand:

Rich morter:

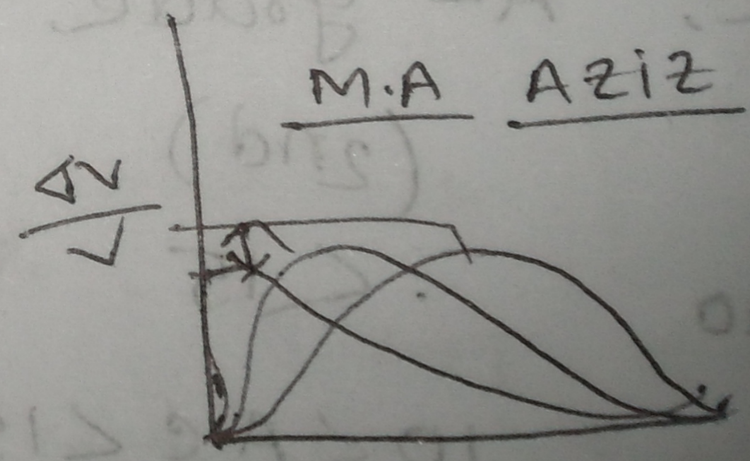
classification of fineness:

Definition of fineness modulus:

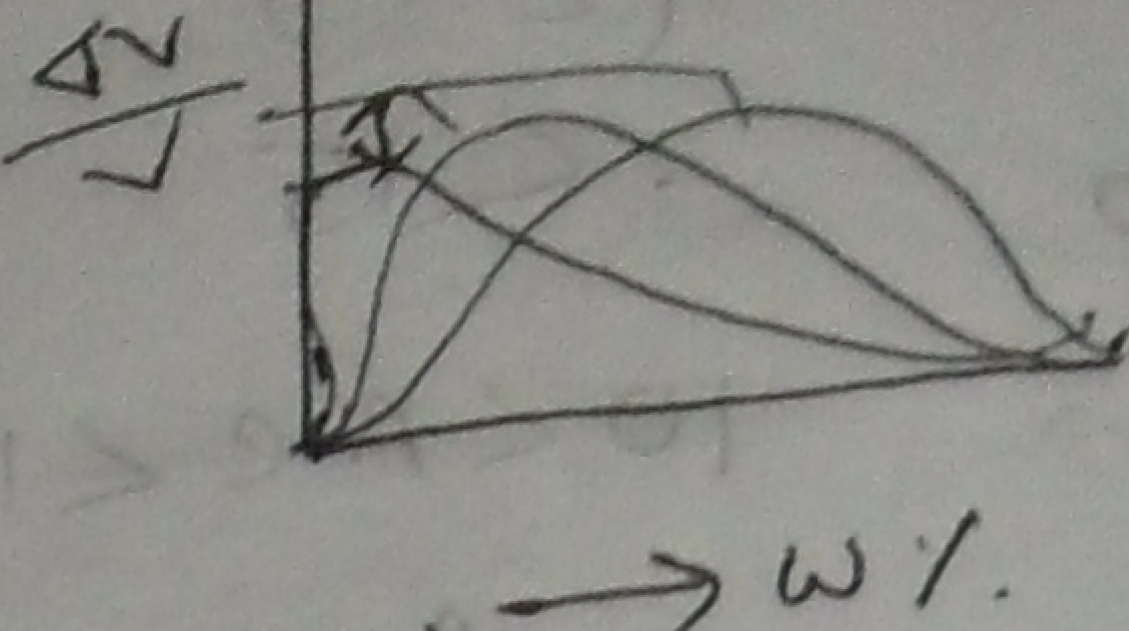
US standard sieves are:

Test for salt:

M.A AZIZ



Test for salt :



(5) 09-06-12 শনিবার

Mortar : types of mortar :

কোন কিছু না বলে mortar বললে cement mortar বুঝতে হবে

Frammed structure, Non-frammed structure

(column, beam, plinth)

Concrete : = cement : FA : CA

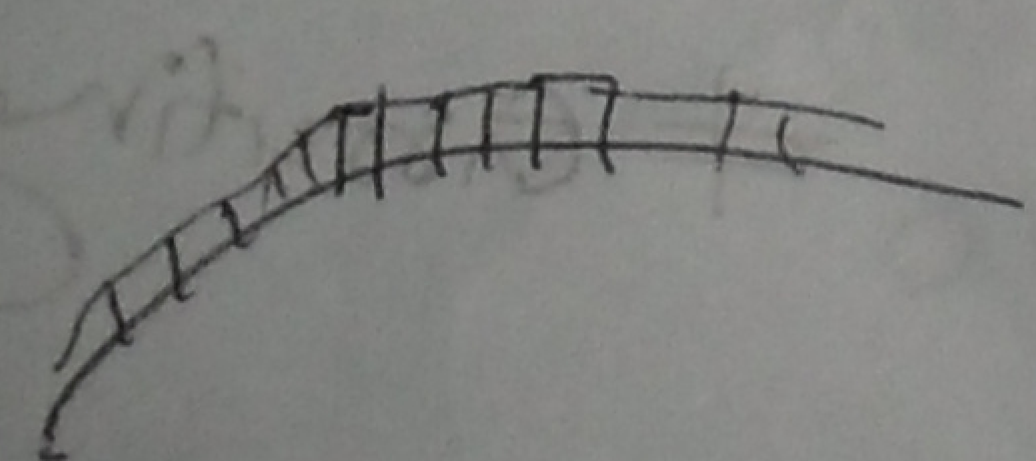
1 : 2 : 4

Mortar = cement : FA

1 : 3 ~ 1 : 4

~~linkte~~ lintel is a type of beam above opening.

lintel এর bottom layer এ রড দিতে হবে।



তবে ইট সরলে collapse হওয়ার ~~সম্ভাবনা~~ সম্ভাবনা বেশি

Arch wall এ।

ছাদে 1:3
[illegible] 1:6
} plaster work.

Masonry wall &
Arch এ তো
[illegible] পড়তে হবে।

Test for salt :

(5) 09-06-12 শনিবার

Mortar : types of mortar :

কোন কিছু না বলে mortar বললে cement mortar বুঝতে হবে

Frammed structure, Non- frammed structure

(column, beam, plinth)

concrete : = cement : FA : CA

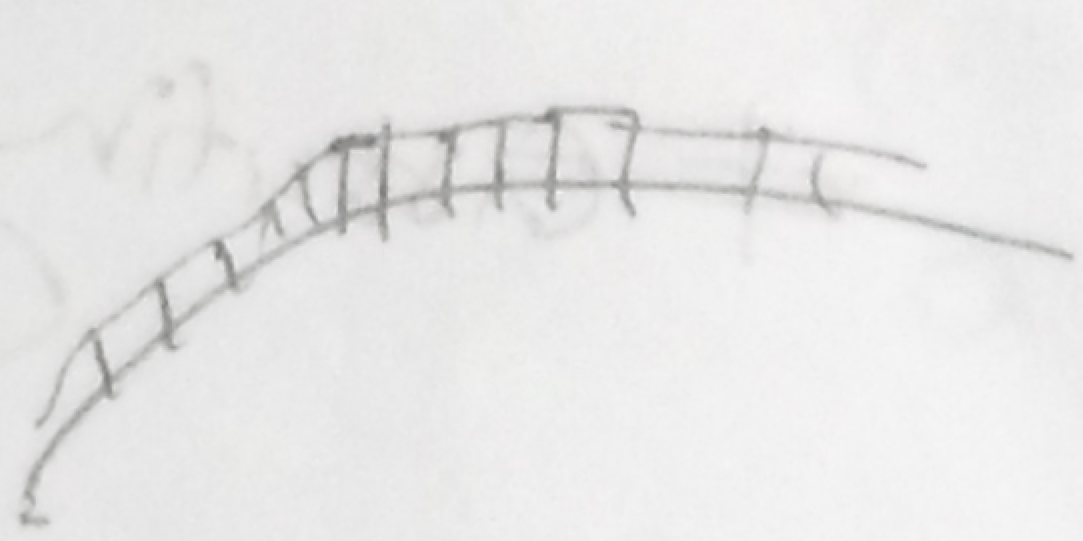
1 : 2 : 4

Mortar = cement : FA

1 : 3 ~ 1 : 4

~~linkte~~ lintel is a type of beam above opening

lintel এর bottom layer এ রড দিতে হবে।



অর্ধেক ইট সরালে collapse হওয়ার [illegible] থাকে Arch wall এ।

ছাদে 1 : 3 } plaster work.
[illegible] 1 : 6 }

Masonry wall & Arch [illegible] করতে হবে।

Lime:
- → Quick lime (QL) → limestone থেকে পাওয়া যায়
- → Hydraulic lime (HL)
- → Poor lime (PL)

limestone এর source হলো $CaCO_3$.

$$CaCO_3 \xrightarrow[air]{heat} CaO + CO_2\uparrow$$

CaO ↓ Quick lime

(95%) ক্যালসিয়াম থেকে তৈরি হয় Quick lime

5% Adulteration (Ad) ↳ clay (Aluminum oxide + Iron oxide + magnesia)

QL → 1% Ad
PL → (>30%) ''
HL → (10-25%) ''

Quick lime + $H_2O \rightarrow Ca(OH)_2$
ক্যালসিয়াম অক্সাইড হয়েছে Hydration বলে।
পানির সাথে strong affinity থাকে।

HL পানির সাথে ধীরে বিক্রিয়া করে।
PL '' '' জোরে '' '' ''

Hydration of lime is the chemical combinat of lime with water.

During slaking;
- volumetric expansion
- Heat generation
- Sound ''

} Incase of Quick lime এর ক্ষেত্রে এই তিনটি ease vigorously.

QL এর আয়তনে 2~3 গুণ ~~lime~~ expansion. $Ca(OH)_2$ কে Fat lime বলে।

QL বানার জন্য আমরা কার্বন যুক্ত lime নিতে হবে।

plm → মানে poor lime mortar.

বেশি বেশি cementic power hydraulic lime এ

কম " " Quick " এ

clay is responsible for imparting cementic power of lime.

clay এর percentage QL এ কম → strength কম

" " " HL " বেশি → strength বেশি

" " " PL " অনেক " → কম.

– যার strength বেশি তার Ad বেশি হতে হবে।

cementing material জলের মধ্যে যেটি setting হলো,

Hydraulicity is the property of cementic material.

কার্বন নিচে set করার ক্ষমতা হলো hydraulicity.

power of setting under the water is called hydraulicity.

flat lime কখনও hydraulic lime নয়।

HL এর হলে strength (20-25%) Ad কমাতে হবে।

[Lime carefull বাড়াতে হবে]

preparation cement mortar.

50 kg = 1.2 / ft^3 | white cement 40 kg.

Test for mortars: 7 দিনে – 50%.

28 " → Around 95%.

special mortars: — — — —

Lean ক্ষয় opposite Rich
↳ দুর্বল ↳ floor finish

(CT → Seventh week সপ্তাহের)

30-06-12

Lime :

30-06-2012

(6) Lime

fusing agent — cementing Material হিসাবে ব্যবহার

Aquaculture — Fish এর জন্য
— ditches treatment.

Soil Stabilization —

Yellow river — tamed River — Rigid wall দিয়ে

Hill কে slope দ্বারা stabilize করা হয়,

$f = \tan\varphi$ $\varphi \simeq 30'$

Lime treated soil :

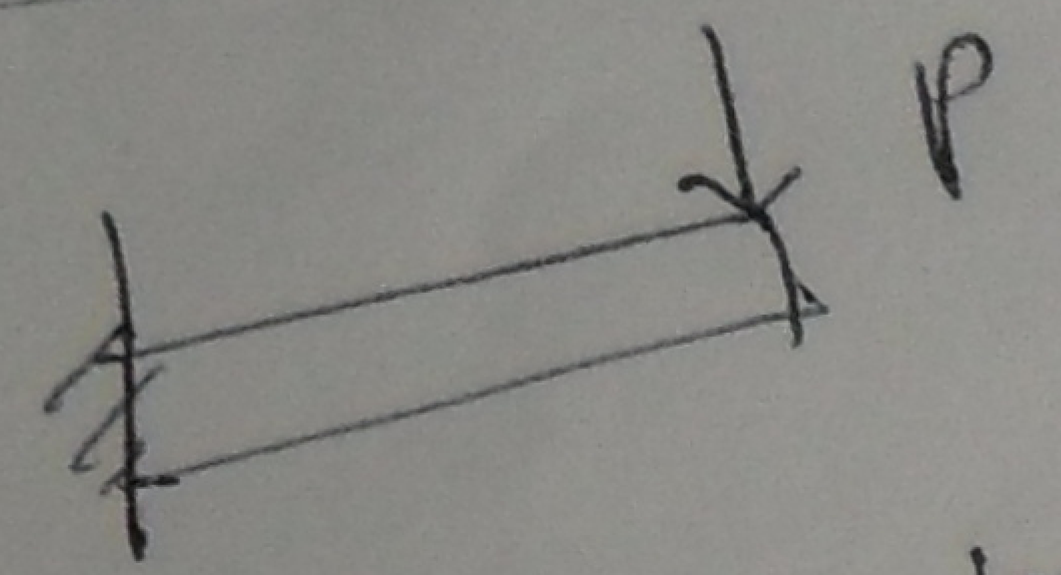
cement " " :

slacking : heat + sound + volumatric expansion

⑦

07-07-12 — শনিবার

portland cement:



Calcareous material:

Difference between cement & Lime;

building এর কলাম casting ope এর বদলে composite (portland) cement ব্যবহার করলে কি হবে?

curing.
↑
Hydration rate

setting: C_3A, → $3CaO.Al_2O_3$
Hardening; C_3S, C_2S, C_4AF.
48% 24%

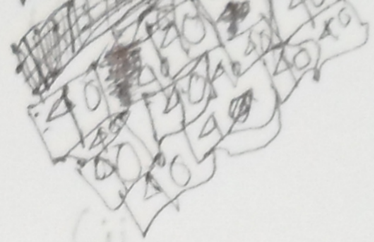
$C_4AF > C_3A > C_3S > C_2S$
1–2hr 1–2hr 7 Days 28 Days

Rapid Hardening:

Mass Concentius:

proportioning of cement Ingredients

EKRAM



Mortar

- brick wall & arch wall দুটোতে কোনটাতে cement বেশী লাগে,

Lime
- quick lime (95% CaO)
- hydraulic lime (10-25% Cl)
- poor lime (>30%)

Adulteration → clay (Alumina, FeO, MgO)

Slaking

Hydraulicity - under water → Piling.