

Architectural Technology V

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Mortar Type Characteristics

Mortars are classified by ASTM C 270, *Standard Specification for Mortar for Unit Masonry* [Ref. 2], into four Types: M, S, N and O. These four Types of mortar can be made with portland cement, masonry cement, mortar cement or blended cements some of which are combined with hydrated lime.

Each mortar Type has some basic characteristics:

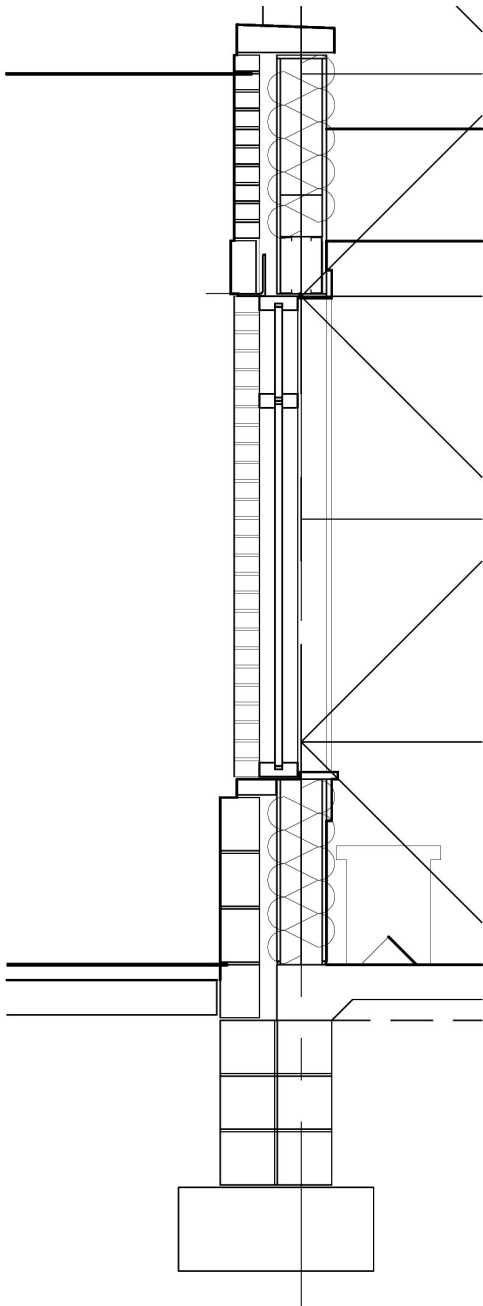
- Type N mortar - General all-purpose mortar with good bonding capabilities and workability
- Type S mortar - General all-purpose mortar with higher flexural bond strength
- Type M mortar - High compressive-strength mortar, but not very workable
- Type O mortar - Low-strength mortar, used mostly for interior applications and restoration

Although the descriptions above provide basic mortar characteristics, each mortar Type can be used in a variety of applications. No single mortar is best for all purposes.

Mortar Recommendations Based on Use

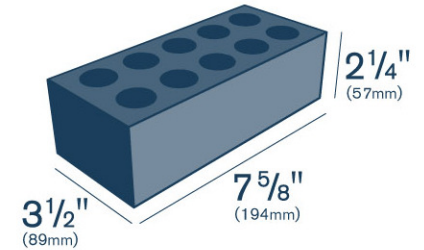
Location	Building Segment	Mortar Type	
		Recommended	Alternate
Exterior, above grade	Reinforced or Loadbearing walls	S	N
	Veneer or Non-loadbearing walls	N	S
	Parapets, Chimneys	N	S
Exterior, at or below grade	Foundation walls, Retaining walls	M	S
	Sewers, Manholes		
Interior	Loadbearing walls	N	S
	Partitions	N	O or S





Modular

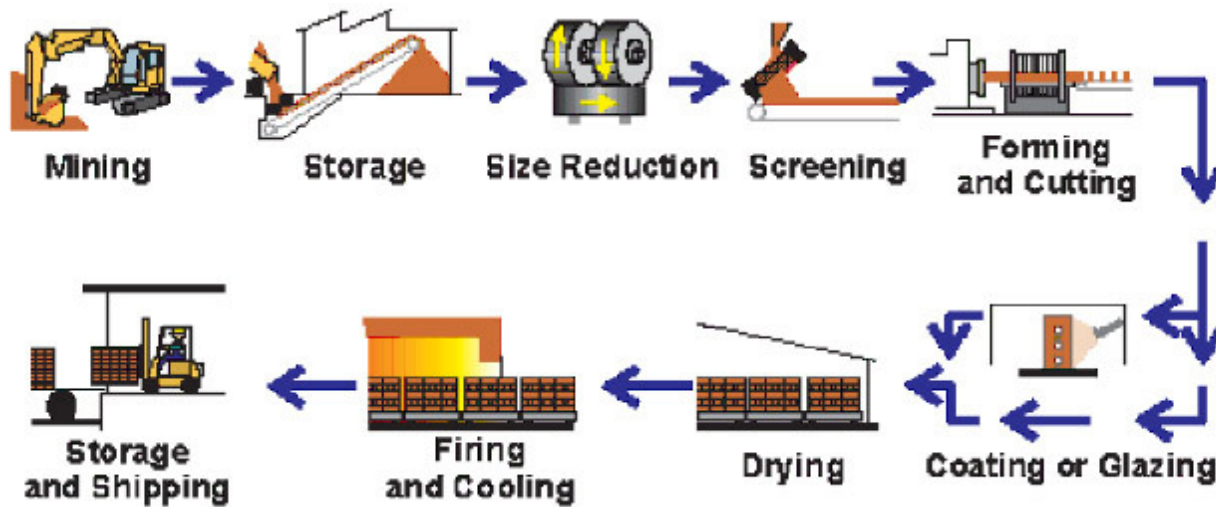
7 5/8" length X 2 1/4" height X 3 1/2" bed depth
 194mm length X 57mm height X 89mm bed depth



vertical coursing 3/8" mortar joint
 (always one brick + one joint in the table below)

horizontal coursing 3/8" mortar joint

No. of courses / units	2 1/4" high	2 3/4" high	57mm high	8" long	7 5/8" long	194mm long
1	0' - 2 2/3"	0' - 3 1/5"	67	0' - 8 3/8"	0' - 8"	204
2	0' - 5 1/2"	0' - 6 2/5"	133	1' - 4 3/4"	1' - 4"	408
3	0' - 8"	0' - 9 3/5"	200	2' - 1 1/8"	2' - 0"	612
4	0' - 10 2/3"	1' - 0 4/5"	267	9 1/2"	2' - 8"	816
5	1' - 1 1/3"	1' - 4"	333	3' - 5 7/8"	3' - 4"	1020
6	1' - 4"	1' - 7 1/5"	400	4' - 2 1/4"	4' - 0"	1224
7	1' - 6 2/3"	1' - 10 2/5"	467	4' - 10 5/8"	4' - 8"	1428
8	1' - 9 1/3"	2' - 1 3/5"	533	5' - 7"	5' - 4"	1632
9	2' - 0"	2' - 4 4/5"	600	6' - 3 3/8"	6' - 0"	1836
10	2' - 2 2/3"	2' - 8"	667	6' - 11 3/4"	6' - 8"	2040
11	2' - 5 1/3"	2' - 11 1/5"	733	7' - 8 1/8"	7' - 4"	2244
12	2' - 8"	3' - 2 2/5"	800	8' - 4 1/2"	8' - 0"	2448
13	2' - 10 2/3"	3' - 5 3/5"	867	9' - 0 7/8"	8' - 8"	2652
14	3' - 1 1/3"	3' - 8 4/5"	933	9' - 9 1/4"	9' - 4"	2856
15	3' - 4"	4' - 0"	1000	10' - 5 5/8"	10' - 0"	3060
16	3' - 6 2/3"	4' - 3 1/5"	1067	11' - 2"	10' - 8"	3264
17	3' - 9 1/3"	4' - 6 2/5"	1133	11' - 10 3/8"	11' - 4"	3468
18	4' - 0"	4' - 9 3/5"	1200	12' - 6 3/4"	12' - 0"	3672
19	4' 2 2/3"	5' 0 4/5"	1267	13' - 3 1/8"	12' - 8"	3876
20	4' - 5 1/3"	5' - 4"	1333	13' - 11 1/2"	13' - 4"	4080
25	5' - 6 2/3"	6' - 8"	1667	17' - 5 3/8"	16' - 8"	5100
50	11' - 1 1/3"	13' - 4"	3333	34' - 10 3/4"	33' - 4"	10200
100	22' - 2 2/3"	26' - 8"	6667	69' - 9 1/2"	66' - 8"	20400



Brick Molding: Soft Mud (Below), Dry-press, Stiff-Mud Processes.

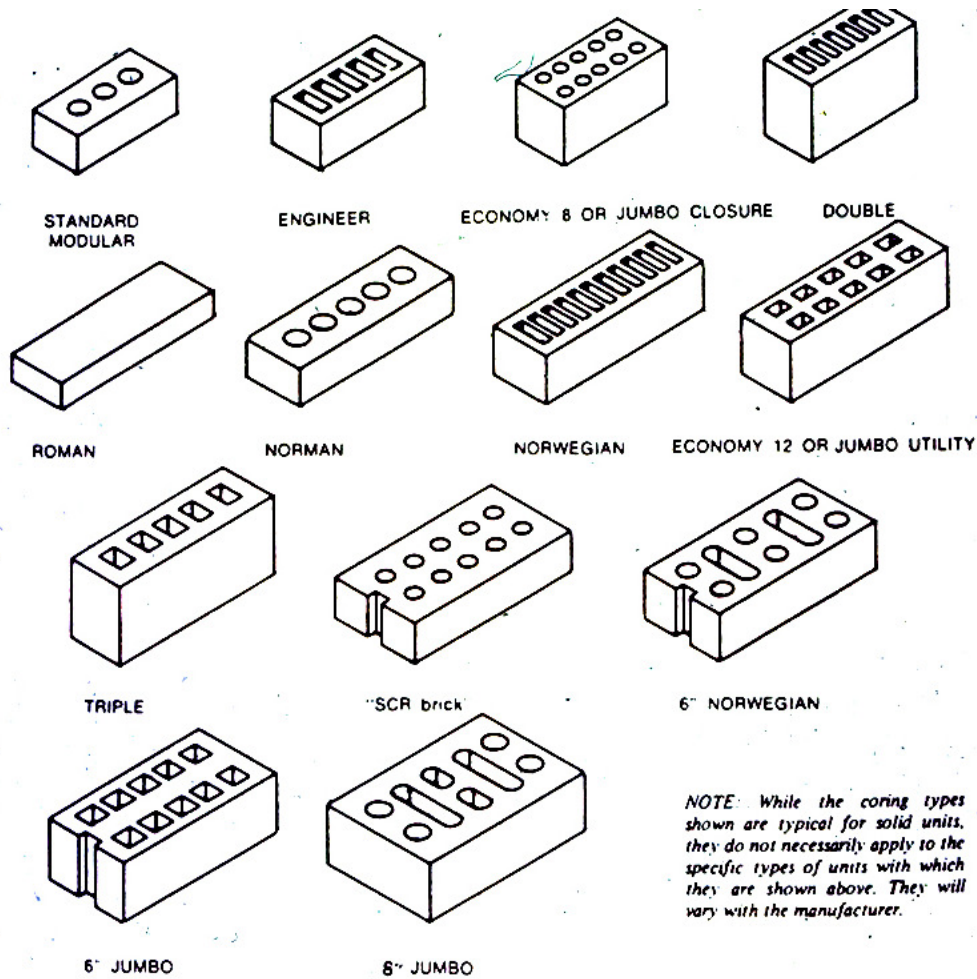


Brick Firing: Periodic Kiln; Tunnel Kiln

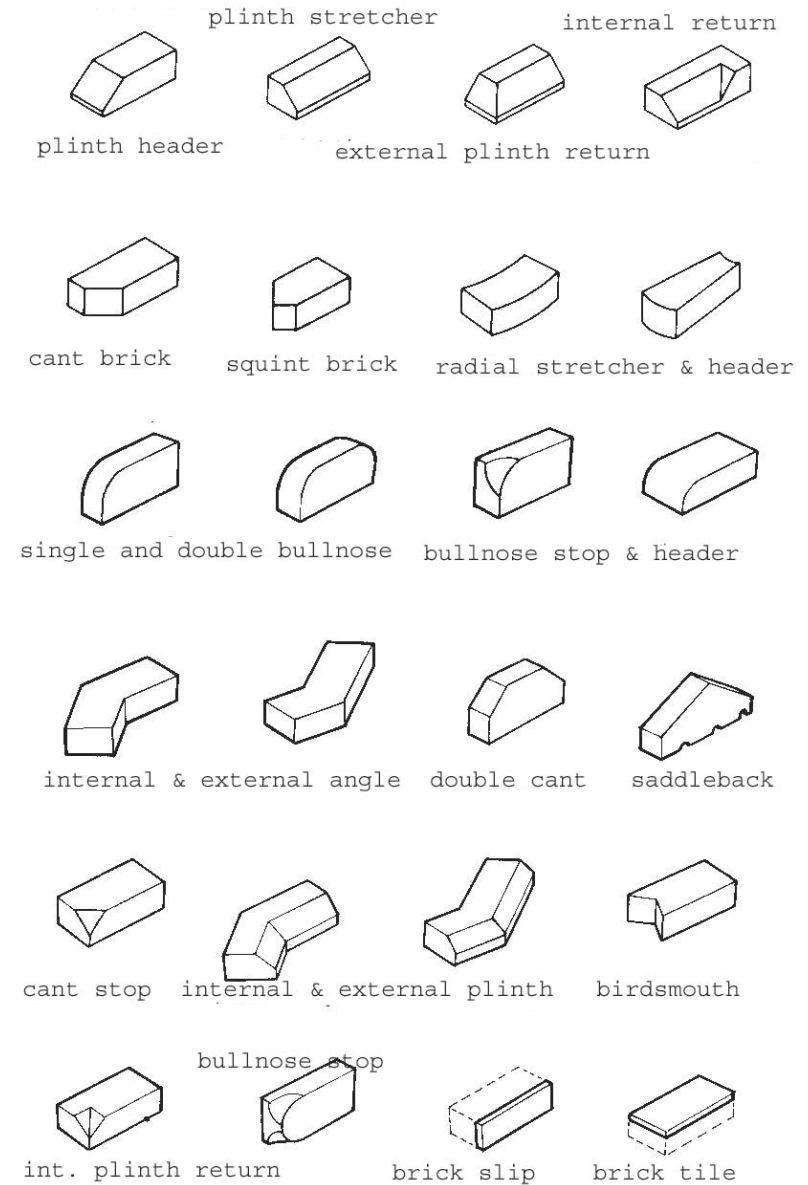
Stages of Firing: Water smoking, dehydration, oxidation, and vitrification.
~40 - 150 hours.

Architectural Technology V

Brick Sizes and Types



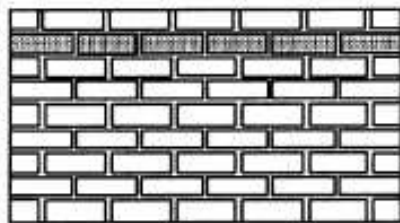
Special Shapes



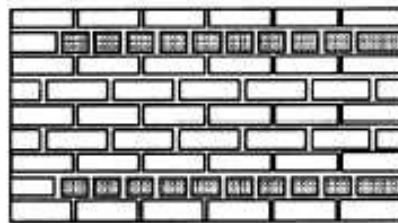
Brick Terminology: Who can tell me...?

Wythe
Stretchers
Headers
Rowlock
Soldier

Brick Bond Patterns



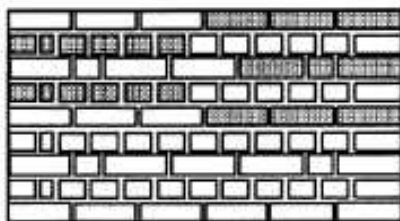
RUNNING



COMMON OR AMERICAN



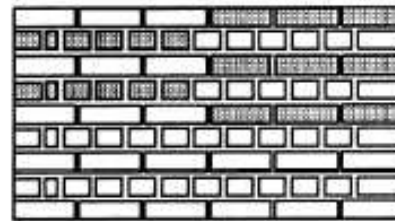
FLEMISH



ENGLISH



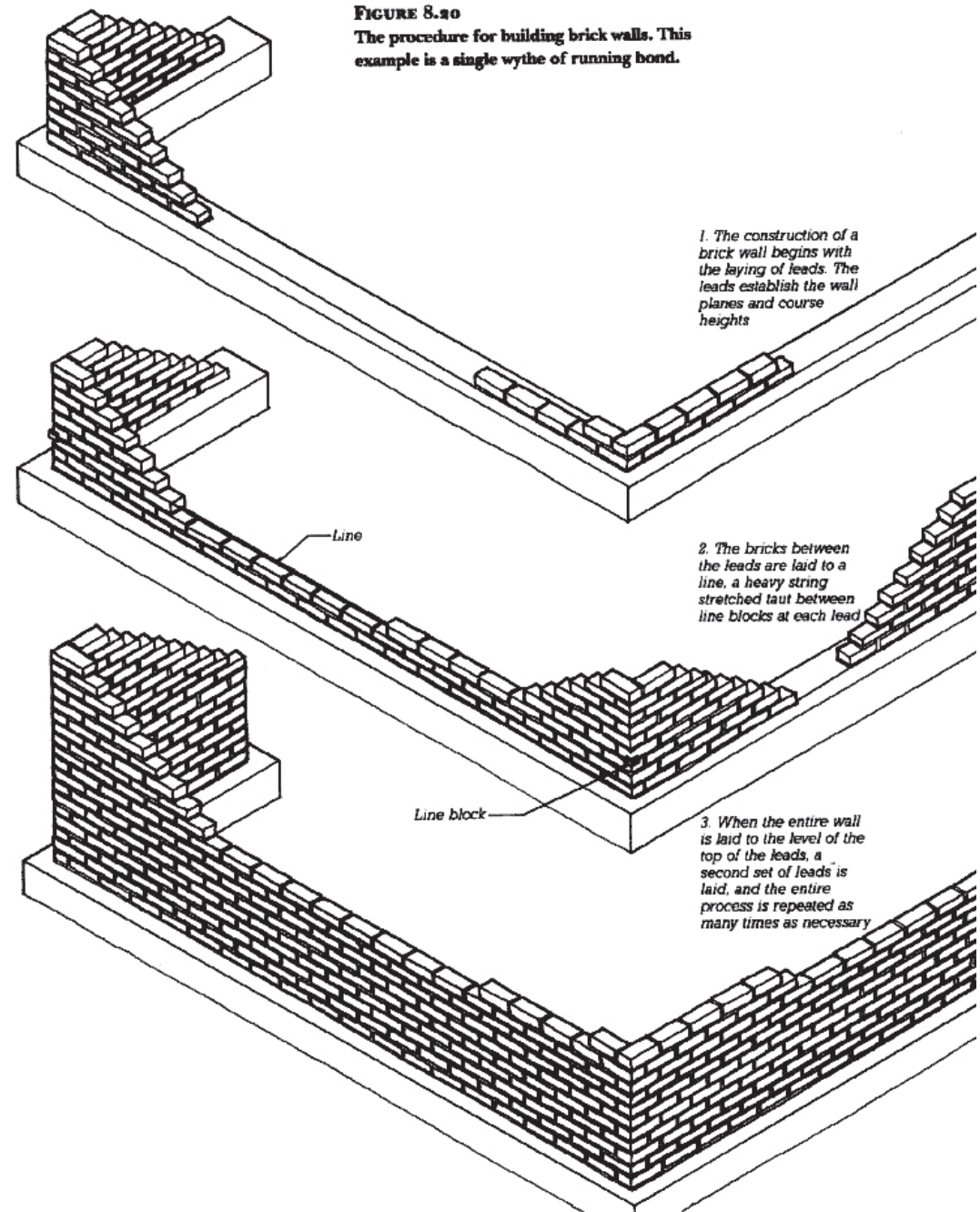
STACK



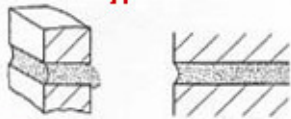
ENGLISH CROSS OR DUTCH

Brick Procedure:

Laying Leads;
Laid to a Line;
New set of Leads...

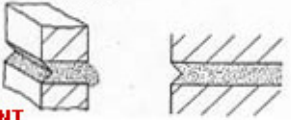


Mortar Joint Types:



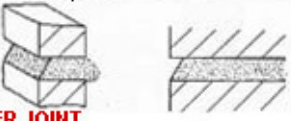
CONCAVE JOINT

Most common joint used, tooling works the mortar tight into the joint to produce a good weather joint. Pattern is emphasized and small irregularities in laying are concealed.



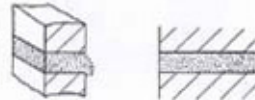
"V" JOINT

Tooling works the mortar tight and provides a good weather joint. Used to emphasize joints and conceal small irregularities in laying and provide a line in center of mortar joint.



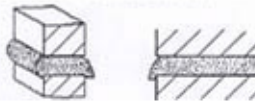
WEATHER JOINT

Use to emphasize horizontal joints. Acceptable weather joint with proper tooling.



FLUSH JOINT

Use where wall is to be plastered or where it is desired to hide joints under paint. Special care is required to make joint weatherproof. Mortar joints must be compressed to assure intimate contact with the block.



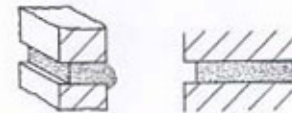
SQUEEZED JOINT

Provides a rustic, high texture look. Satisfactory indoors and exterior fences. Not recommended for exterior building walls.



BEADED JOINT

Special effect, poor exterior weather joint because of exposed ledge - not recommended.



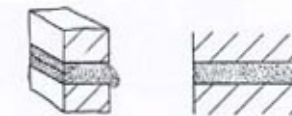
RAKED JOINT

Strongly emphasizes joints. Poor weather joint - Not recommended if exposed to weather unless tooled at bottom of mortar joint.



STRUCK JOINT

Use to emphasize horizontal joints. Poor weather joint - Not recommended, as water will penetrate on lower edge.



GRAPEVINE JOINT

Shows a horizontal indentation.

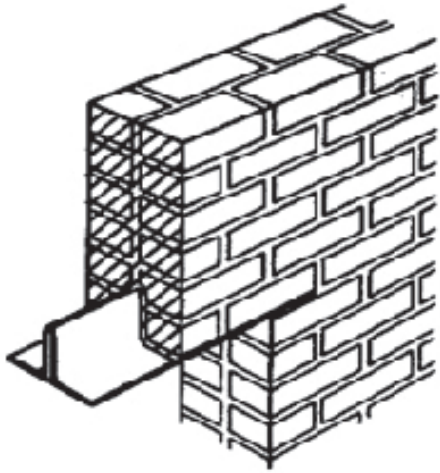
Considerations of Sustainability in Brick Masonry

- Materials often found locally; +
- Energy Intensive; -
- Gathering Materials do disrupt habitats -
- Long lasting, and re-usable +
- No negative effect on indoor air quality +
- Thermal mass useful in energy systems +
- Relatively small waste in construction +

Actual images from the publication
Brick: The Case for Sustainability



Spanning Openings: Lintels



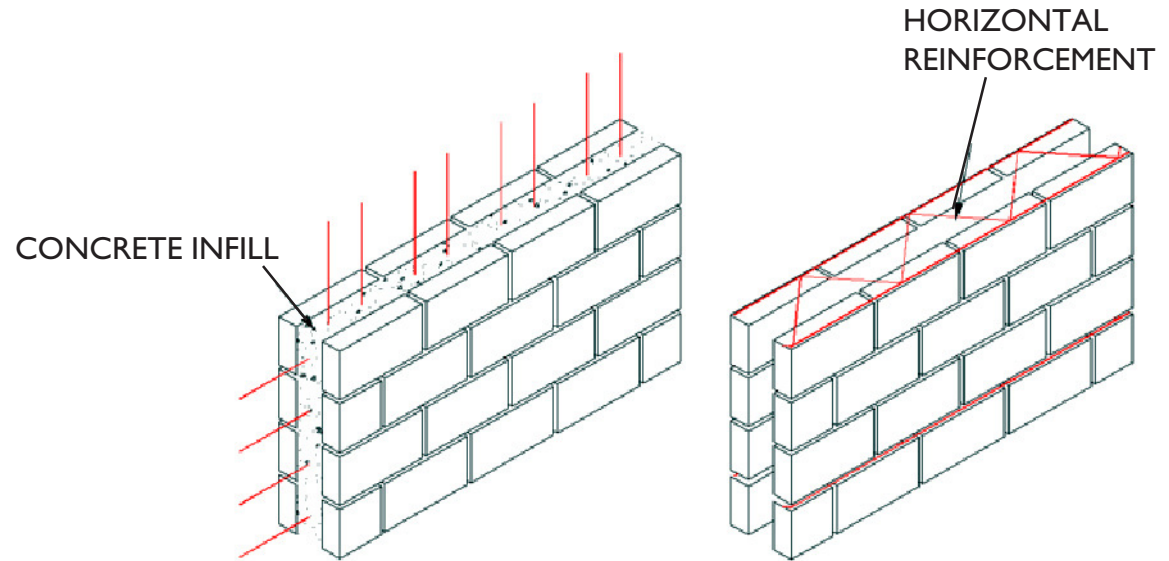
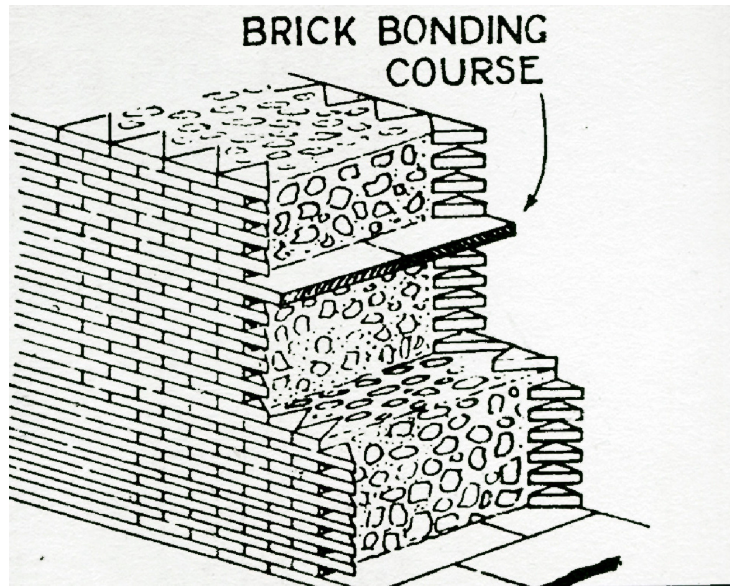
Corbels



Arch



Reinforced Brick Masonry



Masonry Accessories: Ties, Reinforcement, Fasteners, Flashing, Spacers, Weeps, Cavity Devices...

CSI Divisions for Masonry:

04050	Basic Masonry Materials and Methods
04100	Mortar and Masonry Grout
04150	Masonry Accessories
04200	Masonry Units
04400	Stone
04500	Refractories
04600	Corrosion-Resistant Masonry
04700	Simulated Masonry
04800	Masonry Assemblies
04900	Masonry Restoration and Cleaning

MA-SON-RY

not

MA-SON-A-RY





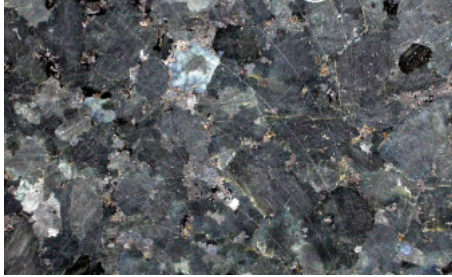


Stone!



Types of Stone

Igneous Rock -- From Granite to Pumice or Tufa



Sedimentary Rock -- Limestone, Sandstone



Metamorphic Rock -- Marble, Slate

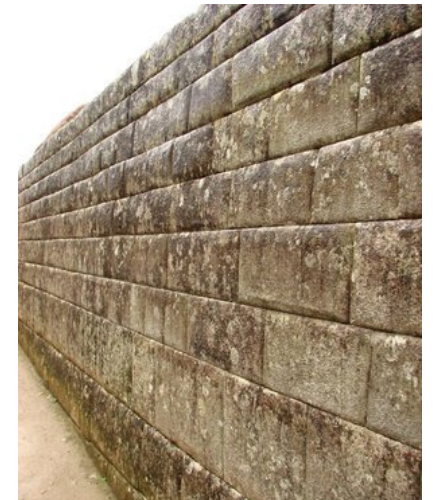




Rubble Stone (Random and Coursed)



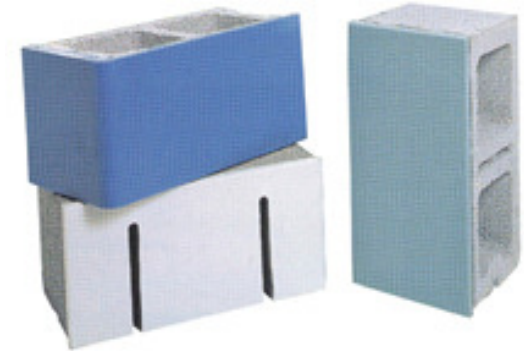
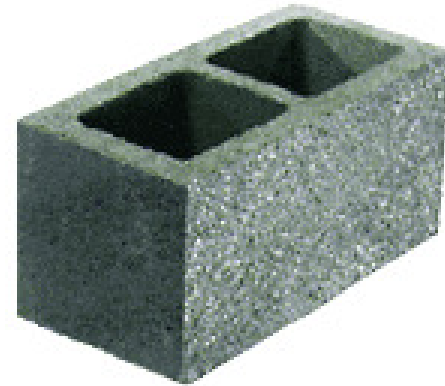
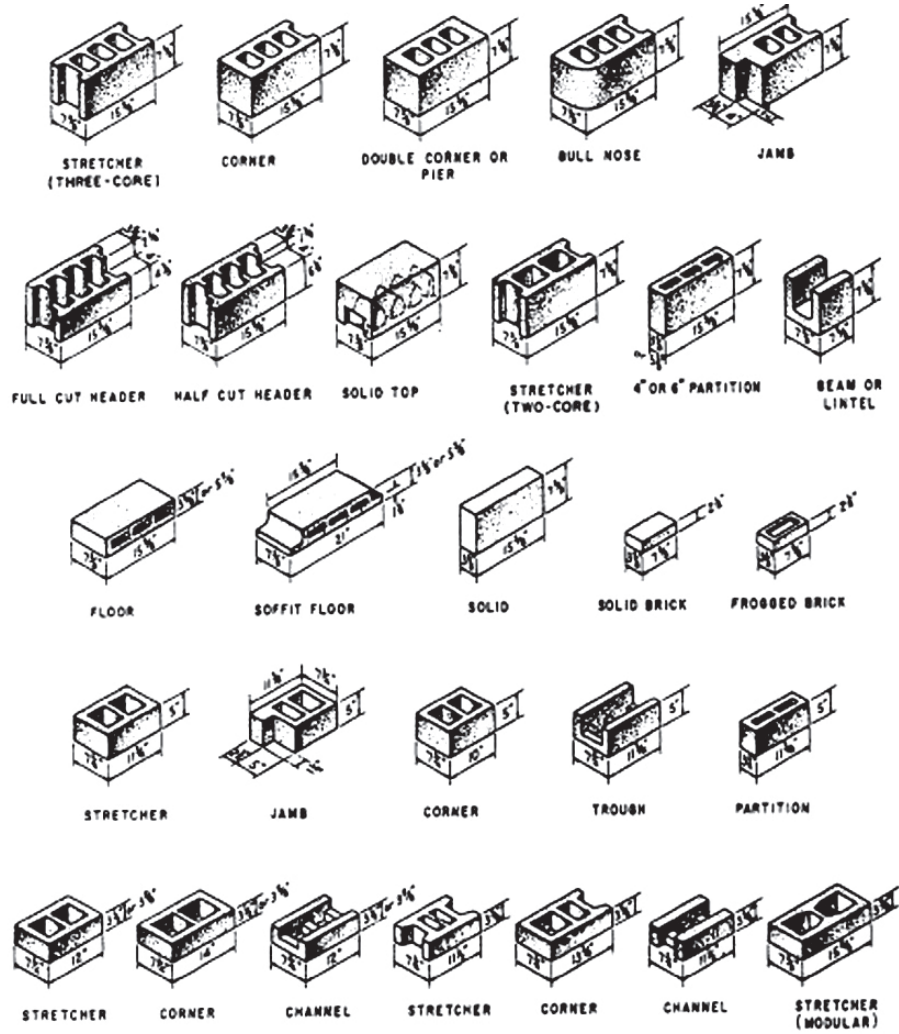
Ashlar Stone (Random and Coursed)





Not!

Concrete Masonry Units



Unfinished, Split-faced, Ground-faced, Polished Faced, Glazed

Other Types of Masonry Units: Glass Block

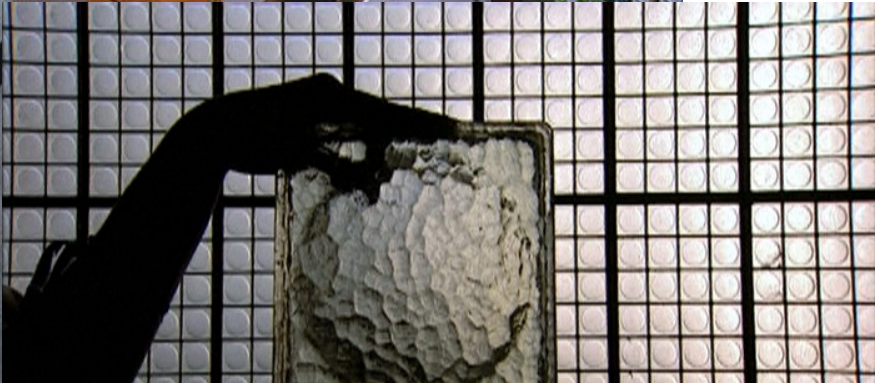


ACC (Autoclaved Aerated Concrete)



Terracotta





Next Week: Masonry Wall Construction and Detailing

Wall Types!

Flashings!

Joints!

Spanning Systems!

Codes!

... and the Challenges of Masonry Construction.