BUILDING TECHNOLOGY I

Stone and Concrete Masonry

MATERIALS in ARCHITECTURE:

3 approaches to choosing materials for construction:

1 - <u>Fundamentals</u> of building materials:

- Materials origin
- Materials production processes
- Forms of different materials – and how forms generated?
- Potential applications

Another words, we need a knowledge of <u>materials' properties</u> + an evaluation process for choosing particular materials for particular uses in construction, and how they will effect a building's performance.

MATERIALS in ARCHITECTURE

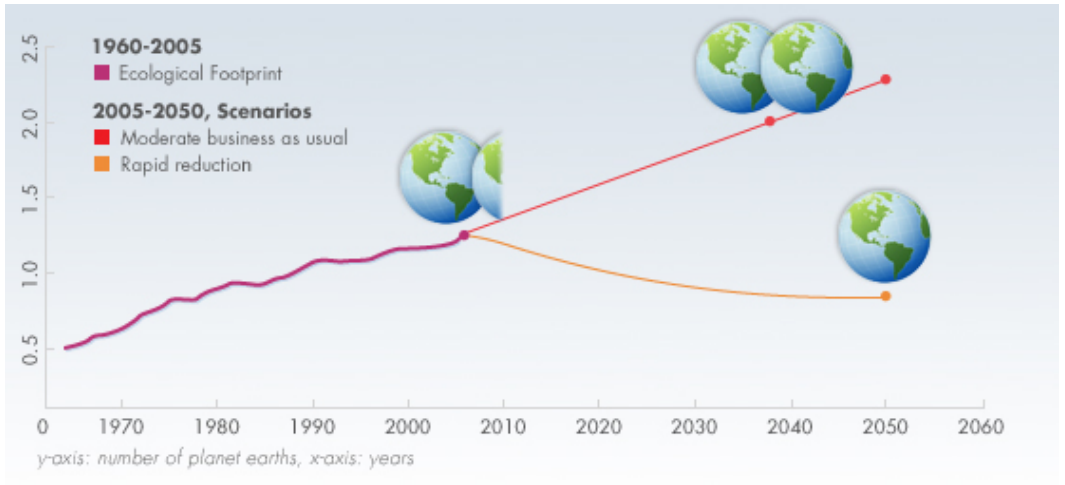
3 approaches to choosing materials for construction:

2 – Tangible qualities of materials: (Surface)

- Visual
- Tactile

3 – Sustainability criteria:

- Materials effect on environment + our health
- Durability
- Recyclability



SUMMARY OF MATERIAL'S STRUCTURAL PROPERTIES

MASONRY: stone + concrete masonry

Properties + Applications

origins + production, chemical composition, appearance; environmental parameters

- Types + classification of stone
- Quarrying + Milling
- Stone patterns
- Concrete Masonry Units
- Masonry wall layout
- Decorative masonry units

Louis Sullivan Bayard-Condict 1899 NYC

STONE CLASSIFICATION

3 types of stone

Divisions based on rock formation process

IGNEOUS ROCK

SEDIMENTARY ROCK

METAMORPHIC ROCK

STONE CLASSIFICATION mineralogical properties

Type	Igneous	Sedimentary	Metamorphic
How formed:	Formed directly from magma	Weathering, deposition or erosion of other rocks; carried by H2O or glacier, dep'd again; pressure forms mass cemented together by binders such as quartz, calcite, clay	From existing rocks by either high pressure, high temp or chemical influence
Structure:	Dense, non-directional, to due gradual cooling; other cool faster	Depend on size of particles – conglomerates, sand or siltstone plus binders become:	Dense, free from almost all voids
	High compressive strength	Strength determined by binder	
	Weather-resistant		
Stones	Granite slower cool; basalt cool faster;	Sandstone – easy to work, low abrasion; Limestone – mostly calcium carbonate, porous; Travertine	Slate, marble, gneiss
Uses:	Foundation, walls, cladding; basalt good exterior but slippery	Almost everywhere, except where low resistance to cleaning + abrasion make not recommended	Widely – interior + ext

IGNEOUS

SEDIMENTARY

METAMORPHIC

BUILDING STONE CLASSIFICATION

6 stone groups

GRANITE GROUP

LIMESTONE GROUP

QUARTZ GROUP

SLATE GROUP

MARBLE GROUP

"OTHER" GROUP

FIELDSTONE: stone harvested from earth's surface

QUARRIED STONE: stone excavated from earth

"Scalia" Limestone Quarry Assisi Italy

Limestone structure, Assisi Italy

QUARRIED STONE: stone excavated from earth

Quarrying stone -- Ancient Techniques

DIMENSION STONE: quarrying + fabrication

Traditional fabrication

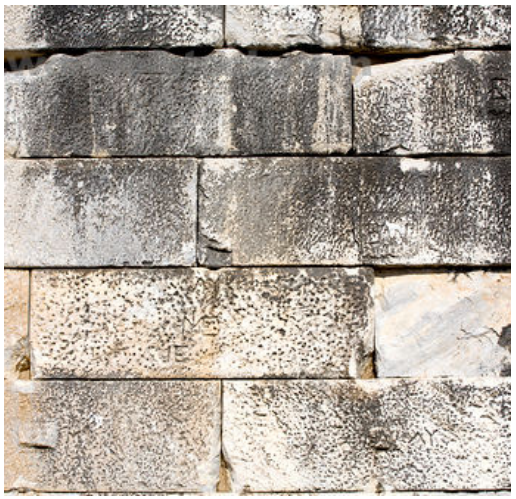
Modern fabrication

STONE MASONRY PATTERNS: rubble stone coursing

COURSED
RUBBLE STONE

RANDOM
RUBBLE STONE

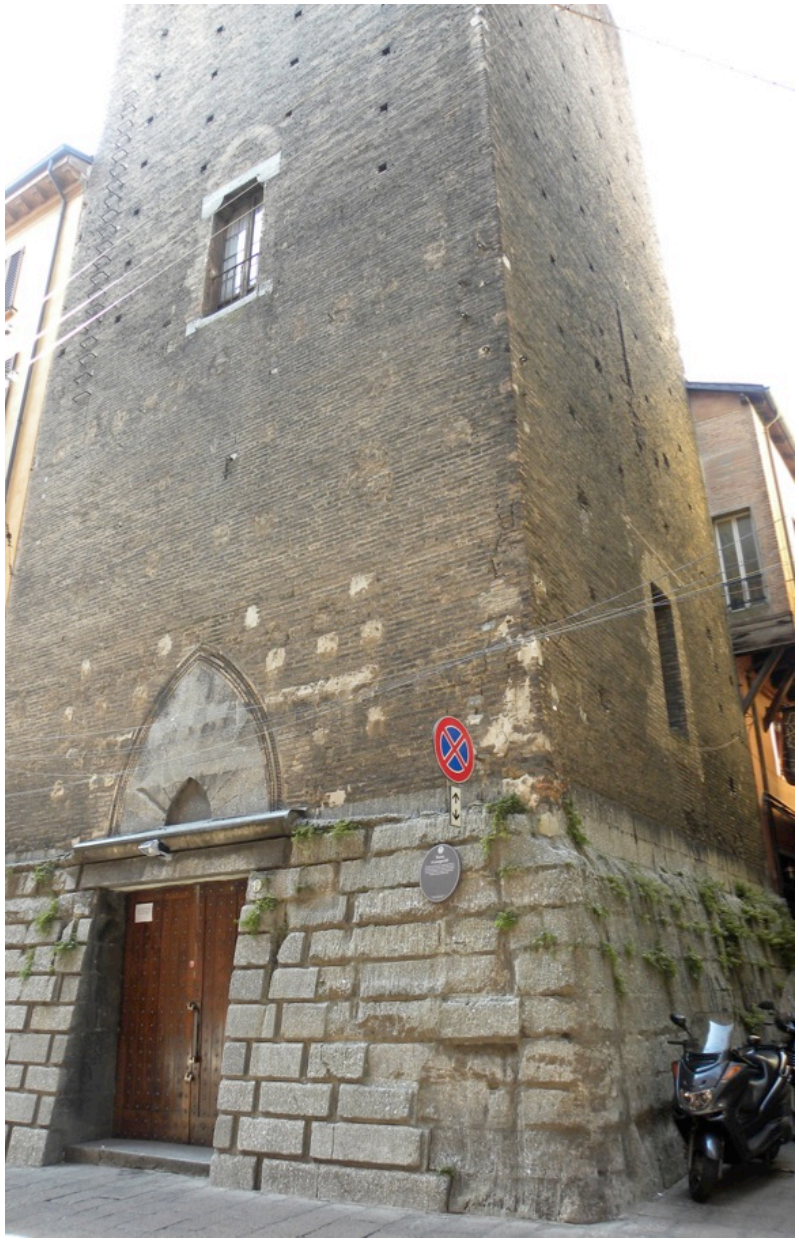
STONE MASONRY PATTERNS: ashlar stone coursing



COURSED ASHLAR STONE

RANDOM ASHLAR STONE

STONE MASONRY CONSTRUCTION: properties



STRONG IN
COMPRESSION

STONE MASONRY CONSTRUCTION: properties

Lanyon Quoit, UK
ca. 3000 BCE

STRONG in COMPRESSION

Pont du Gard (Aquaduct) France 19 BCE

STONE MASONRY CONSTRUCTION: properties

STONE CAN WORK IN TENSION TO A LIMIT

STONE MASONRY:

summary

- stone is limitless
- plastic quality facilitates sculptural expression
- flexible: from massive bearing walls to thin cladding material
- durability imparts sense of permanence
- weathers beautifully