GYPSUM CONSTRUCTION

- Most widely used of all interior construction materials.
- May be field-applied as gypsum plaster
- May be pre-fabricated as gypsum wall board (GWB)
- Used as a surface material for walls and ceilings
Description

- A gray to white mineral, hydrous calcium sulfate, called alabaster
- Mined from vast veins, close to the surface
- Contains approximately 30% bound water
- In processing, gypsum is heated to drive out the water and form a white powder called Plaster of Paris
- For field application, Plaster of Paris is mixed with water on the job site.
- For pre-fabrication, Plaster of Paris is factory manufactured into paper-covered sheets called gypsum wallboard (GWB)
Advantages

- Durable and hard
- Fire resistant
- Sound resistant
- Fast installation
- Easy to repair
- Light weight
- Inexpensive
- Excellent **substrate** for paint, fabric and wood

**Substrate:** a material used as a support or base for a finish material
Disadvantages

- Not resistant to water
- Not structural
- Reflects sound
- Lacks intrinsic character
Sustainability

- Low embodied energy
- Non-toxic
- Abundant
  - 75% from mines
  - 25% “recaptured”
- Easily recycled
- Face papers are recycled newspapers

Embodied energy: Total energy needed to grow, mine, manufacture, transport and install a material
Systems

- Gypsum wallboard (GWB) prefabricated panels
- Plaster applied in the field
- Veneer plaster combination of thin plaster finish coat over gypsum lath

Grand Central Terminal - plaster groin vault

Gypsum wallboard

Veneer plaster
Gypsum Wall Board (GWB)

Types

- Standard
- Type X – fire-rated
- Greenboard – moisture resistant *not water resistant*
- Gypsum lath – used as a substrate for veneer plaster

Sizes

- Width: 4’0” is standard *also available at 4’6”*
- Length: 8’, 10’, 12’, 14’ are common
- Thickness: 1/2” and 5/8” are common *also available at 1/4”, 3/8”, 3/4”, 1”*
GWB Installation

- Gypsum wall board is screwed to the underside of the joist to form the ceiling and to the studs to form the wall surface
Tape and Spackle

- Gypsum wallboard edges are typically tapered slightly so that when they meet at wood or metal stud they can be finished with tape and spackle and not show a bulge in the wall surface.
- Spackle (joint compound) is wet plaster applied at the joint between two sheets of gypsum wallboard.
- Tape, either paper of fiberglass, is embedded into the spackle as reinforcement.
- Galvanized steel corner beads are installed at outside corners to protect the gypsum wallboard.
Wood Framed Gypsum Wallboard Partition
vertical section detail

- Base building joists and sub-floor
- Nail on plates and studs
- Screw on gypsum wall board with blocking as req’d
- Install tape & spackle, crown molding and wood base
Wood Framed Gypsum Wallboard Partition
plan detail

nail plate and studs to sub-floor
screw on gypsum wallboard
install tape and spackle and corner bead and spackle
Veneer Plaster

- Finish coat of plaster is field applied over gypsum lath
- Provides the economy of GWB
- Provides the flatness and smoothness of field-applied plaster
Plaster

- Harder, flatter, and much more expensive than GWB
- Used for arches, domes and other intricate shapes
- Plaster of Paris powder is mixed with water on the job and applied over lath
- Traditional lath was wood slats separated by a space so wet plaster could ooze through and form “keys” for solid anchorage
- Modern lath is expanded galvanized sheet steel, often called “diamond lath”
- Three coats of plaster are often applied
  - Scratch coat to anchor plaster to framing
  - Thick brown coat to give plaster strength and weight
  - Thin finish coat to flat and smooth (or textured) appearance
Lath

- Lath is used to anchor plaster to studs
- Traditional lath is wood slats nailed to studs and separated by approximately \( \frac{1}{4} \)" to allow the wet plaster to ooze through to the back of the lath and harden into solid "keys".
- Modern lath is light gage galvanized steel cut with small slits, then expanded to form a diamond pattern
Plaster on Wood Studs Partition
vertical section detail

- attach grounds and expanded metal lath to studs
- apply three coats of plaster
- install base and crown molding
Metal Framed Partitions

- Interior partitions in buildings over three stories high are typically constructed with metal studs because wood studs are prohibited because of flammability.
Steel Framing

- In high-rise buildings, **steel columns** rest on massive concrete foundations.
- A framework of **steel beams** are supported by the columns at each floor.
- Heavy gage **corrugated metal decking** is supported by the beams.
- **Reinforced concrete.** Typically 4” to 6” thick, is poured on the metal deck for form a solid, stable floor.
Metal Studs and Runners

- Metal studs and runners are made of sheet steel, bent to shape, and **galvanized** to prevent rust.
- Typical studs and runners are 25 gage to allow the use of **self-tapping drywall screws**.
- Runners are U-shaped and are anchored to the floor and the deck above. (Analogous to plates in wood construction.)
- Studs fit inside runners and have returns for extra strength and stability.

**Galvanize:** application of a thin layer of zinc to steel to prevent rust on decking, studs, ductwork, and many other items.

**Gage:** thickness of metal. The higher the gage the thinner the metal. 1/gage gives the approximate thickness in inches. 25 gage is approximately 1/25” thick.

**Self-tapping drywall screws:** screws with sharp points that don’t require that a hole be drilled for fastening.
Stud Width

- 1 5/8” studs are too thin for free-standing partitions but are useful for furring.
- The most commonly used studs are 2 ½” wide and are used for partitions up to approximately 13’ high.
- For extra strength or higher partitions, 3 5/8” wide studs may be used.
- 4” and 6” studs are used for plumbing walls.

Furring: a one-sided partition used in front of existing walls, around columns, to form soffits, etc.
GWB Partition with Metal Framing
vertical section detail

- base building floor and deck
- install runners and studs
- install GWB
- install ceiling and base