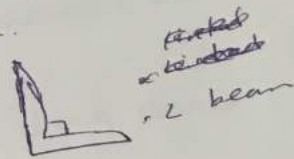
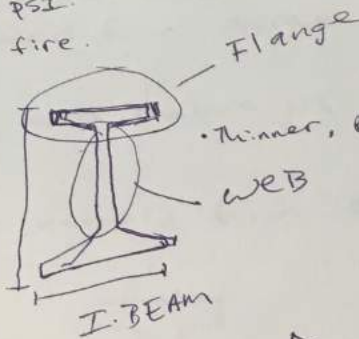


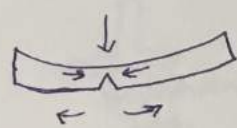
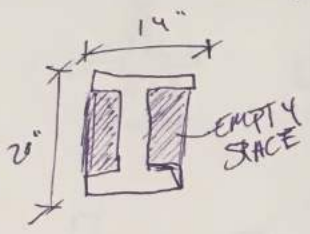
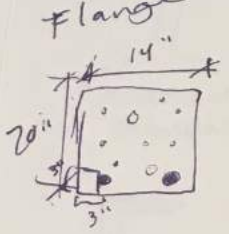
April 4

Steel have 43,000 PSI.
steel weakness is fire.

- I beams:
- width and height about the same.



wide Flange



FREE PRESS ALL
↓ ↓ ↓
 $F = MA$

FLANGE = Compression
WEB = ~~Neutral~~ Neutral

wrought iron
- very low Carbon

steel
• less than 2% Carbon

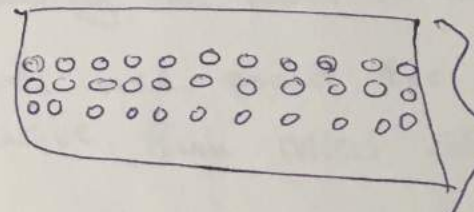
cast iron
• 3% - 3.4% Carbon

• Malleable / weaker

• workable / strong

• hard

• process of converting iron ore to steel begins with the smelting of ore into cast iron.



Connection Rivets

• Found in Subway Stations

• Coke is burned by large quantities of air forced into the bottom of the furnace to produce carbon monoxide.

• Today, most structural steel for frames of ~~build~~ buildings is produced from scrap steel in so-called mini-mills.

• Scrap is rolled and shapes up to 40 inches (1m) deep.

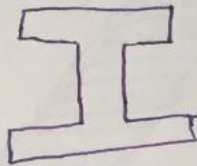
• Scrap is made mostly from 300,000 junk cars.



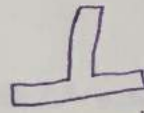
American Standard



wide Flange



wide Flange



structural tee



Bar 2x2



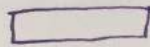
Channel



Angle, unequal leg



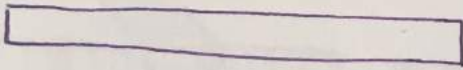
Angle equal leg



Bar 2x6

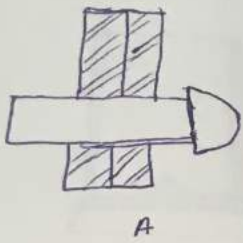


Bar 2" round

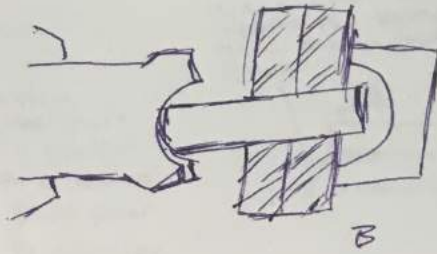


Plate

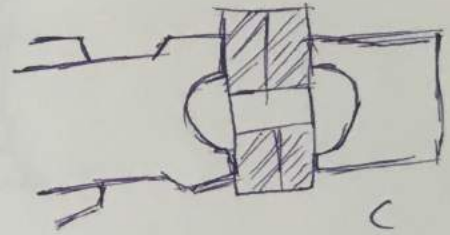
- Cast steel is made by pouring molten steel directly into molds and allowing the steel to cool.
- Cast steel are pound for pound more expensive than rolled steel.
- Because cast parts are produced in small quantities, they can economically utilize specialized steel alloys selected on the ~~basis~~ basis of a part.



A



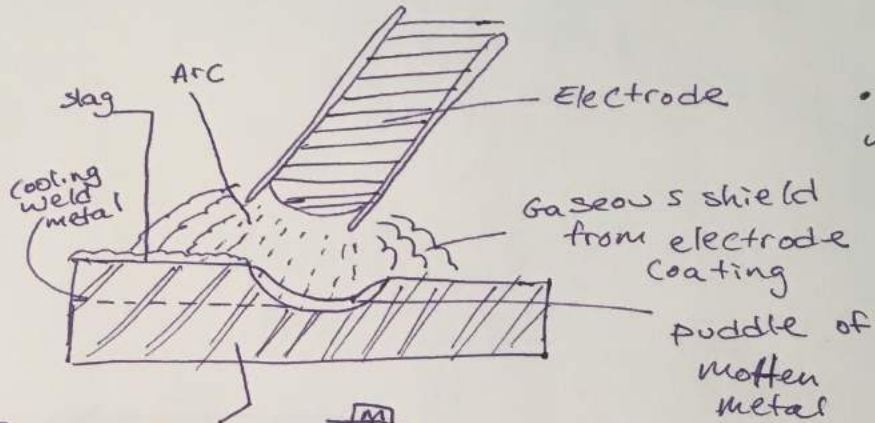
B



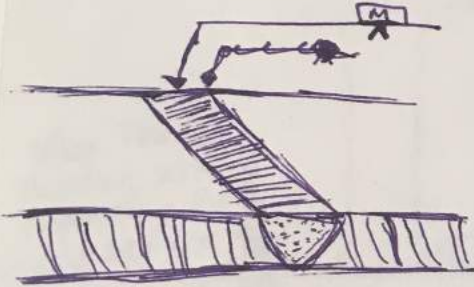
C



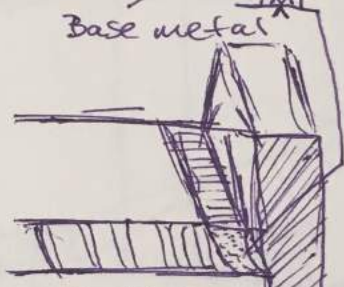
D



• electric arc welding process



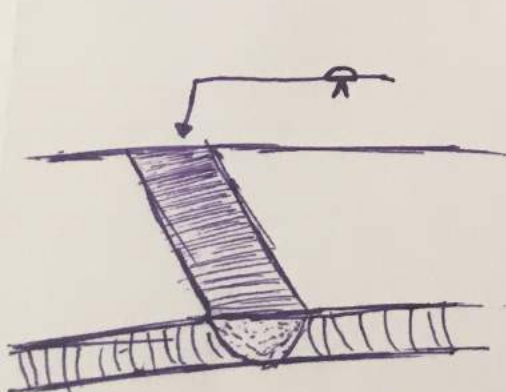
V-groove weld with Backup Bar



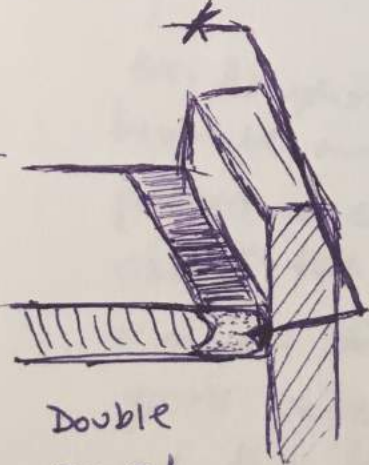
single-bevel groove weld with Backup Bar



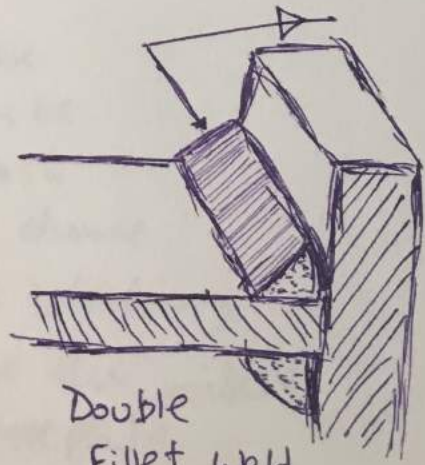
Fillet weld



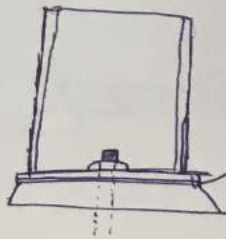
V-groove weld



Double bevel groove weld



Double Fillet weld

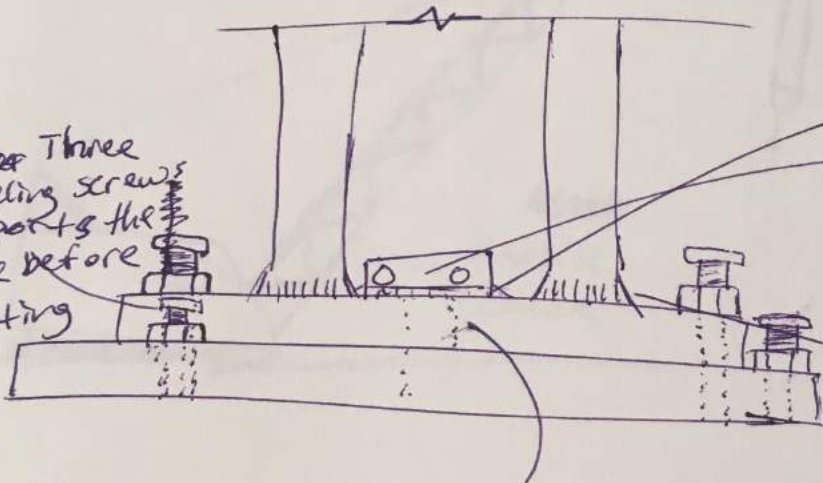


A thin steel plate is leveled on a bed of grout prior to erection of the column.

leveling nuts on the anchor bolts supports the baseplate and column before ground.



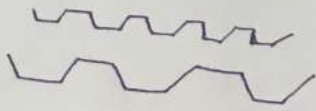
Three leveling screws supports the plate before grouting



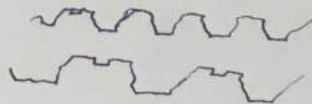
A pair of angles and two bolts supports the ~~two~~ columns before it is welded to the baseplate.

Holes through the baseplate may be provided on each side of the column as a way of introducing grout under the middles of the baseplate.

Form Deck

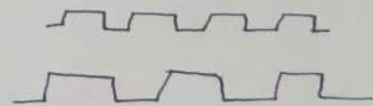


Composite Deck

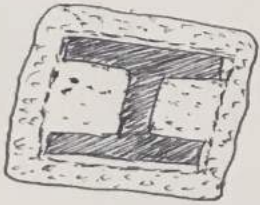


- Composite Deck is designed to work together with the concrete.
- Makes a ~~stiff~~ stiff, ~~lightweight~~ lightweight cal deck.

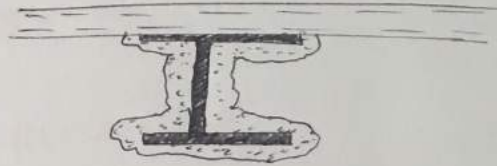
Roof Deck



- For roofs of low steel-framed buildings many different types of ~~deck~~ decks are ~~available~~ available.



- Plaster reproofing has largely been replaced by beam and column ~~enclosures~~ enclosures made of boards or slabs of gypsum or other re-resistant materials.



- (SFRM) commonly referred to as sprayed-applied reproofing, have become the most prevalent type.
- This is sprayed ~~on~~ over steel to the required thickness.
- This product are available ~~available~~ in weight of about 12 to 40 lbs

Site work & Shallow foundations.



Spread the load into the Earth.

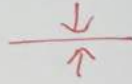
• Bottom of building is bigger to help spread the load.

ground

Soft Rocks

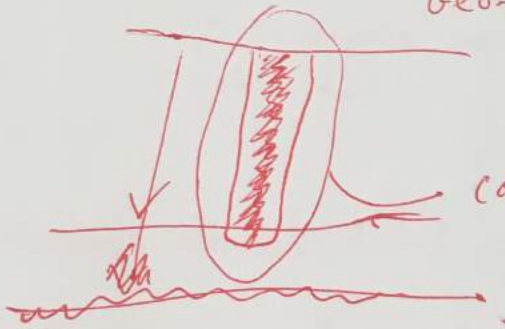


Focus must be equal.
• If top focus is greater, then the building will fall apart.



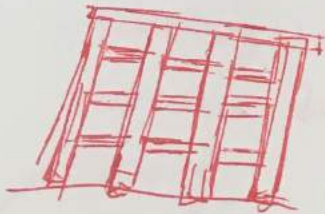
• We have to make the ground focus greater so it can be equal.

Geo-technical Engineering Investigation.



Compressive Resistance

Foundations must meet following three general requirements



Uniform foundation



different foundation

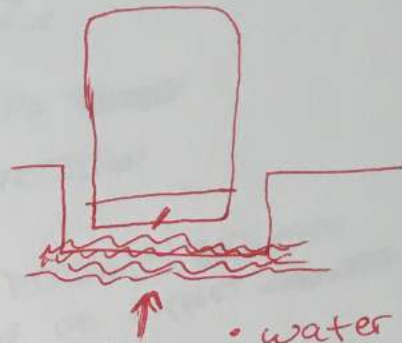
1. must be safe against structural failure that ~~even~~ could result ~~the~~ in collapse.
2. must not settle during life of building in such a way that would damage structure or impair function

Earth materials are classified according to:

- particle size
- presence of organic content
- sensitivity

~~Review~~ Use test pit or test boring to determine:

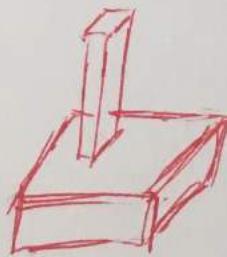
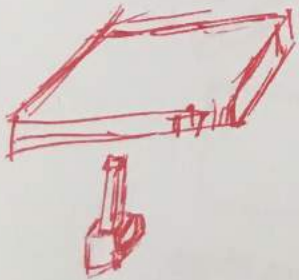
- water table (where soil is saturated)
- samples are taken to lab.



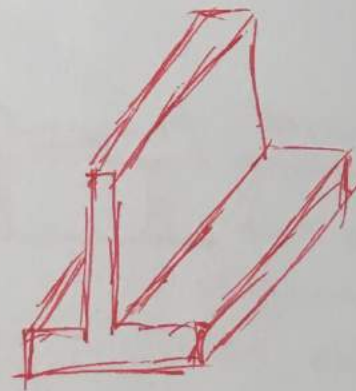
- water can freeze which will lead to expanding the land.
- This can cause damage (cracks) to the building.

Shallow foundations

- Add a slab or a footing.
- Footing is there to spread the loads.

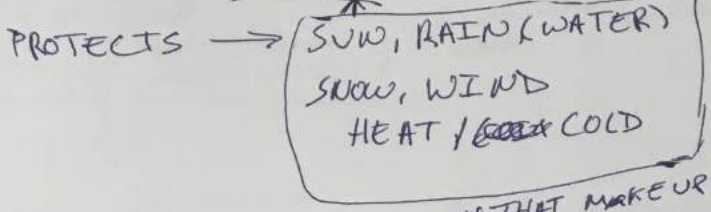


Column footing



Wall footing

diagram
STRUCTURE + ENVELOPE



EPDM

MEMBRANE - used on most roofs.
(Between plastic and rubber)

LAYERS - MATERIAL THAT MAKE UP AN ENVELOPE

ROOF = PROTECT

PROTECTION

ORDERED
ORDERING SYSTEM

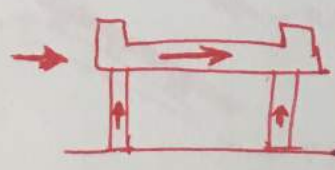
SPAN - DISTANCE BETWEEN COLUMNS OR SUPPORT POINTS
* MAKING SPACE

IMPERVIOUS

NOT PERMIABLE
(WATER ISNT ABLE TO GO THROUGH)



optimize energy performance



Because the gravity loads for a building originate with the roof system its structure layout must correspond to that of the column.

Steel Trusses



- metal or cement roof decking or panels span spaces.
- members are bolted or welded with gusset-plate connection
- To prevent secondary bending stresses from developing, the centroidal axes of the trusses members and the loads at a joint should pass through a common point.
- Trusses require lateral bracing in a direction perpendicular to their plane.
- mechanical services such as piping, conduit, and duct work may pass through in the web spaces.
- Space bearing plate.
- channel or w-shape purlins span and Truss spacing.
- structural steel or reinforced concrete column = support

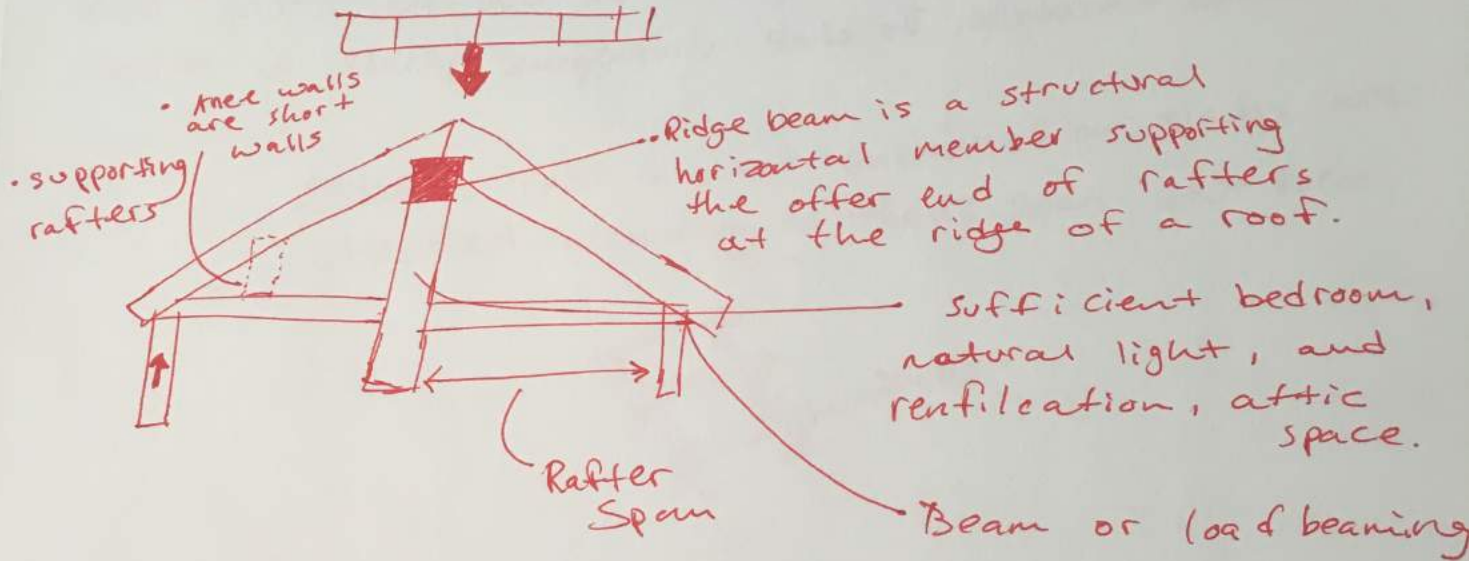
Roof Framing

- Rafter 2x6, 2x8, 2x10, 2x12
- Sheathing - ~~1/2~~ 3/4" ply wood

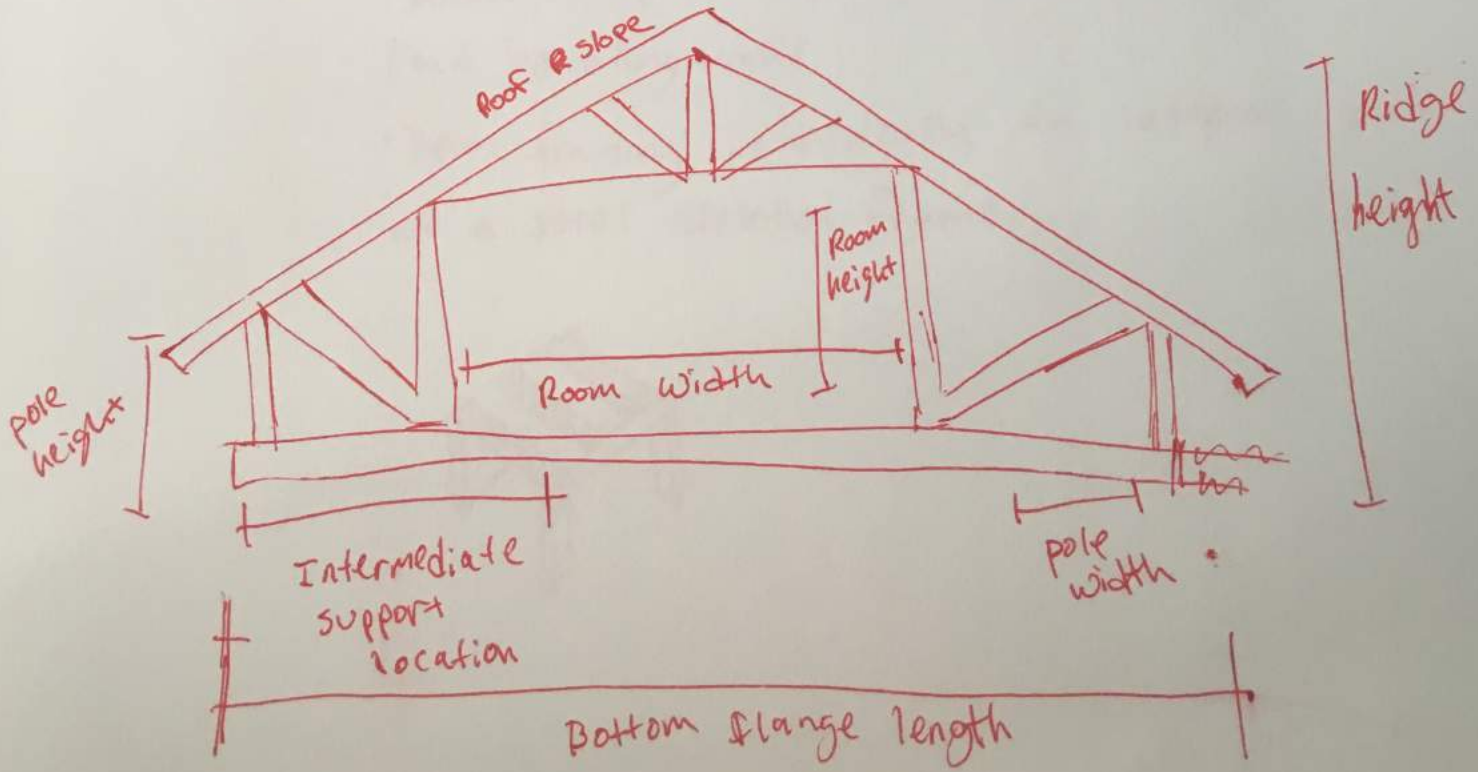
Finish

- shingles
- Asphalt
- one-slate
- Tile - clay
- wood

- metal - "galvanized" "seam"
- cmu - concrete masonry unit



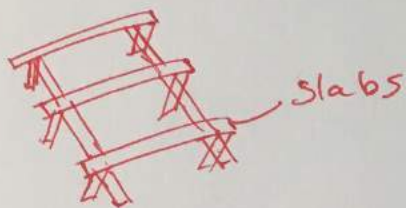
Rafter ties between the exterior wall or beam supports are not required.



Floor Systems

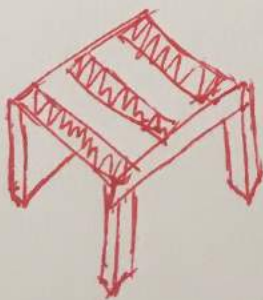
- Floor systems are the horizontal planes that must support both live loads.
- A floor system may be composed of a series of linear beams joists overlaid with a plane of decking or consists of nearly homogeneous slab of reinforced concrete.

Concrete - cast in place concrete floor, slabs are classified according to their span cast form.



Steel

- Support steel decking or precast concrete planks.
- Beams may be supported by girders, columns, or load bearing walls
- Beam framing is typically an integral part of a steel skeleton frame.



Structure and Envelope

cking
chapter 12

envelope:

• protection

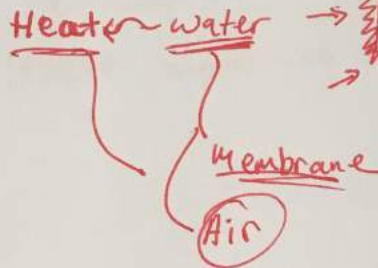
Rain, Snow, sun → Heat

↳ UV Rays



Seal ?

Interface

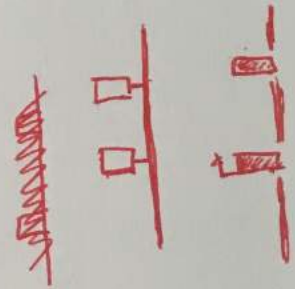
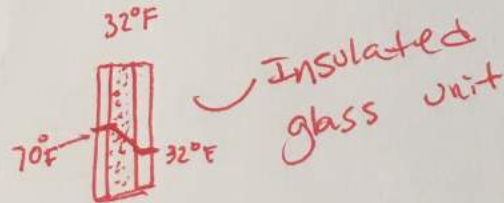


Thermal Bridge -

materials that conduct heat.

Condensation

↳ holds water vapor.



Primary Functions of An Exterior Wall:

1. keep water out
2. prevent air leakage
3. control light
4. Control Radiation of heat
5. Control conduction of heat
6. Control Sound

Secondary Functions of An exterior wall

7. Resist wind loads
8. Control water vapor
9. Adjust to movement
10. Resist fire
11. ~~use~~ weather gracefully
12. easy to install.

Aluminum's advantages for use in cladding systems:

1. protects itself against corrosion