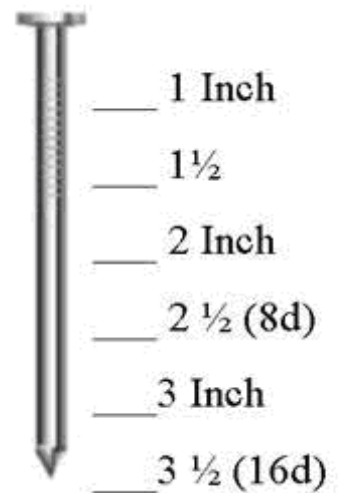




Appendix B Framing Handout

Fasteners Used:

- On 2 x 4 and 2 x 6 walls use (2) 16 penny nails on the top and bottom of each stud.
- On 2 x 4 and 2 x 6 double top plates use (1) 16 penny nail (try to center it so you don't hit the nails used for the studs). Double top plate seams are to receive (2) 16 penny nails.
- Bottom plates are to be nailed with (2) 16 penny nails per stud opening. When nailing down exterior walls bottom plates make sure to nail as close to the outer edge as possible to hit the rim joist. When nailing down the interior wall bottom plates try to hit floor joists as often as possible. (Make sure you don't nail doorways as these bottom plates will be removed).
- On sheathing use 8 penny nails. The perimeter is to be nailed every 4" to 6" and the field is to be nailed every 6" to 8".



Lumber Sizes / Types:

(Note: there are many sizes and types of lumber however these are a few of the most commonly used types on Milwaukee Habitat sites)

- 2 x 4 - varies in length typically anywhere from 6' to 24'. A 2 x 4 is actually 1 1/2" x 3 1/2" due to the process of drying and planing (process used to make the wood smooth).
- 2 x 6 - varies in length typically anywhere from 6' to 24'. A 2 x 6 is actually 1 1/2" x 5 1/2" due to the process of drying and planing (process used to make the wood smooth).
- 2 x 8 - varies in length typically anywhere from 6' to 24'. A 2 x 8 is actually 1 1/2" x 7 1/4" due to the process of drying and planing (process used to make the wood smooth).
- 2 x 10 - varies in length typically anywhere from 6' to 24'. A 2 x 10 is actually 1 1/2" x 9 1/4" due to the process of drying and planing (process used to make the wood smooth).

- LVL (Laminated Veneer Lumber) – Engineered lumber consisting of many pieces of veneered lumber glued together to give added structural strength. Commonly available in lengths of 24' to 48', thicknesses of 1 ¾" to 3 ½" and depths ranging from 9 ¼" to 18".
- I-Joist – Consist of oriented strand board (OSB) webs fitted into high grade solid sawn lumber or laminated veneer lumber (LVL) flanges. I-Joists are commonly available in lengths ranging from 28' to 48' and depths ranging from 9 1/2" to 16".

Habitat's Plate Marking / Framing Procedure:

- **X's** - indicate stud placement.
- **Red Lines** – indicate placement of interior wall nailers which are placed perpendicular to the studs flush with the interior side of the wall.
- **O's** - indicate placement of the king studs for windows or doors. Doors are indicated by a D (following the number of the door) for example D1 or D2. The same system applies to the windows which are indicated by W1, W2, etc. Window and Door openings are pre-built and delivered to the jobsite; you would then find the corresponding window and or door and install it in the correct opening.
- Each plate is identified with a number. This number also corresponds to the erecting sequence. You will be erecting panels starting with the lowest numbered plate.
- Each plate is marked with an orientation arrow to alert you to the direction it will have in the wall assembly. All plates should be positioned so that these arrows run from rear-to-front on the side walls of the house and as-marked on the wall plan for the front and rear walls.
- Each plate will be marked with the location of any intersecting walls, as well as with the locations of the door and window frames. You will always erect walls numerically (starting with the lowest numbered wall), and position them as directed by the orientation arrow.

Words to Know:

- **Bottom Plate/Sole Plate** - The bottom framing member of a wall that the studs attach to and keep the studs nailed to the subfloor.
- **Ceiling Joist** - Framing system for stick built roofs for sheetrock ceiling in rooms below; Milwaukee Habitat for Humanity only uses these on the front porch ceilings.
- **Center Line** - On plans, a broken line, usually indicated by a dot and dash, showing the center of an object and providing a covenant from which to lay off measurements.
- **Chalk Line** – A light cord that has been rubbed with chalk for marking; the line left by a chalked string.
- **Cripple** – A structural member that is cut less than full length, such as a studding piece above or below a window or a door; framing member used to support rafters.

- **Decking** - OSB that is nailed to the rafters or trusses to create the roof deck. Decking is also used to describe the dimensional lumber used to create the floor for an exterior deck or porch.
- **Double Top Plate / Cap Plate** - The cap plate is used to tie partition walls into adjoining walls.
- **I Joist** - Prefabricated framing lumber used for floors, ceilings, and rafters. I joists are identified by a top and bottom chord of wood usually 2” thick (either solid or pressed wood) with an OSB web between them. They are light and easy to work with and allow for long unsupported spans where an open floor plan is desired.
- **Joist Hanger** - Prefabricated and engineered metal connector nailed to support beams (if flush with frame system) or ledger and band of deck framing.
- **King Stud** - A full length stud in the wall framing system that butts up to each end of a header. The header is both toe nailed and end nailed into the king studs.
- **Penny** - Nails are measured in a system that refers to their size. The unit is called a "penny." The larger the number, the larger the nail. A 3-penny (3 d) nail is much smaller than a 16-penny nail. The origin of the term "penny" in relation to nail size is based on the old custom in England of selling nails by the hundred. A hundred nails that sold for sixpence were "six penny" nails. The larger the nail, the more a hundred nails would cost. Therefore the larger nails have a larger number for its penny size.
- **Sheathing (sheeting)** – The first layer of exterior wall covering nailed to the studding; roof boards are also referred to as sheathing.
- **Snapping Out** - Layout technique after slab is poured/subfloor framed to assure correct placement of house walls. With the use of blueprints, chalk lines are “snapped out” on the subfloor to assure rooms are square and align properly. If lines are snapped out on a different day than the walls will be put in place, they must be covered with clear lacquer.
- **Stud** – A series of slender wood members used to support elements in walls and partitions; vertical members of appropriate size and spacing to support the structure. All Milwaukee Habitat for Humanity studs are 92 5/8” long.
- **Temporary bracing** - 2x4 lumber (10’ lengths) used to straighten and hold walls from moving while either second floor or roof is framed above. One end of the brace is nailed with at least 2 16d nails at the top plate and the bottom is nailed either to the subfloor with the use of scrap lumber or to the bottom plate of the same wall. Top edge of bracing should not extend above the cap plate of the wall to which it attaches. Temp. bracing should never be removed until wall sheathing is in place and either roof is framed in decked (if single story) or second floor is framed and subfloor down.
- **Top plate** - Horizontal framing member of the wall frame unit into which studs are end or toe nailed.
- **Trimmer Stud / Jack Stud** - Wall framing member cut to length to support the ends of a header, either for a door or window. Length of jacks depends on height of rough opening. Jack studs fit under the header and directly beside and touching the king studs.

Additional Notes:

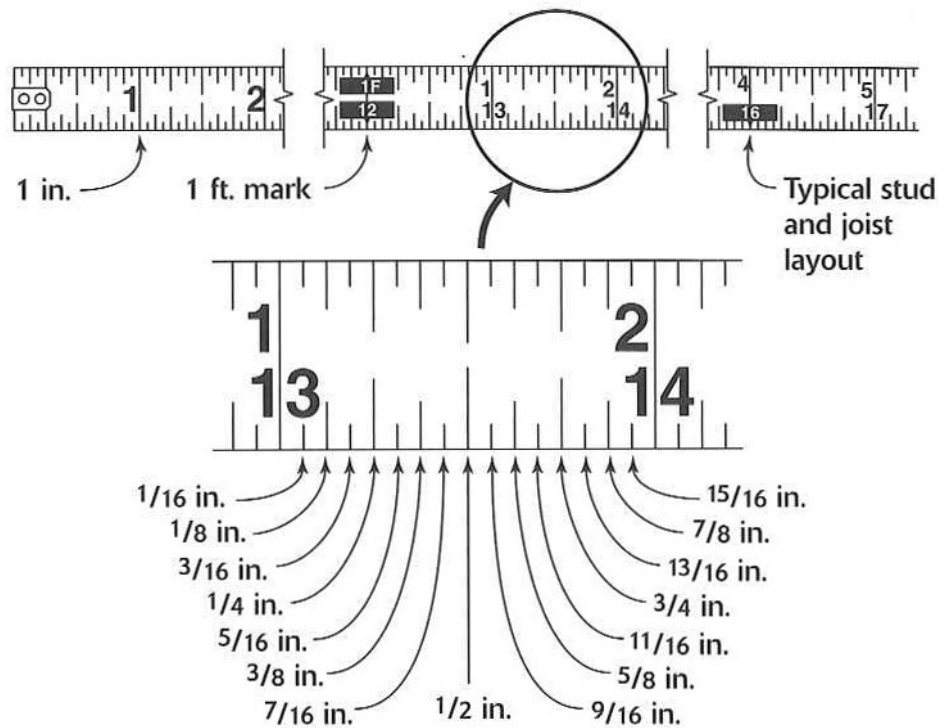
- Make sure exterior walls are square prior to sheathing them. Always position sheathing with the rough side out and even with the bottom edge of the plate. Special care must be given to outside corners so that the sheathing on the end walls interlocks over the side walls (or vice versa).
- Keep all of the temporary bracing in place until lateral support from the interior walls can be provided.
- When you are building the 2nd floor walls, you will also probably want to leave one of the side exterior wall parts out at this time. Leaving it out helps to provide easy access for lifting up and assembling interior wall and roof framing materials.
- Make sure that the walls are positioned properly, with the arrows running from rear-to-front, or according to the plan.
- Make sure that all of the walls are plumb, square, and properly positioned before permanently securing them.
- Once all of the interior walls have been properly positioned, *permanently* fasten them down by nailing the bottom plate to the floor, with two 16d nails in the space between every two studs.
- Don't forget to add drywall backing as needed on the walls and ceilings.
- Make sure to insulate the area where the tub / shower surrounds are going to be installed prior to installing them; be sure to protect the insulation from the rain.

Safety:

- Observe all rules and precautions specified under general, power tools and ladders (see safety manual handout).
- Remove nails from discarded lumber as soon as practical.
- Use a respirator when sanding pressure treated wood.
- Always wear a hard hat when work is being done overhead during the framing stage. Watch for materials falling from above.
- Use caution when walking on floor joists. Watch your footing.
- Cover stair openings as soon as sub-floor is installed with suitable materials.
- Install a slide guard about 6" from the bottom of the first course of roof sheathing as soon as it is installed to prevent tools or personnel from sliding off the roof.
- Install GFCI circuits in the temporary power system.

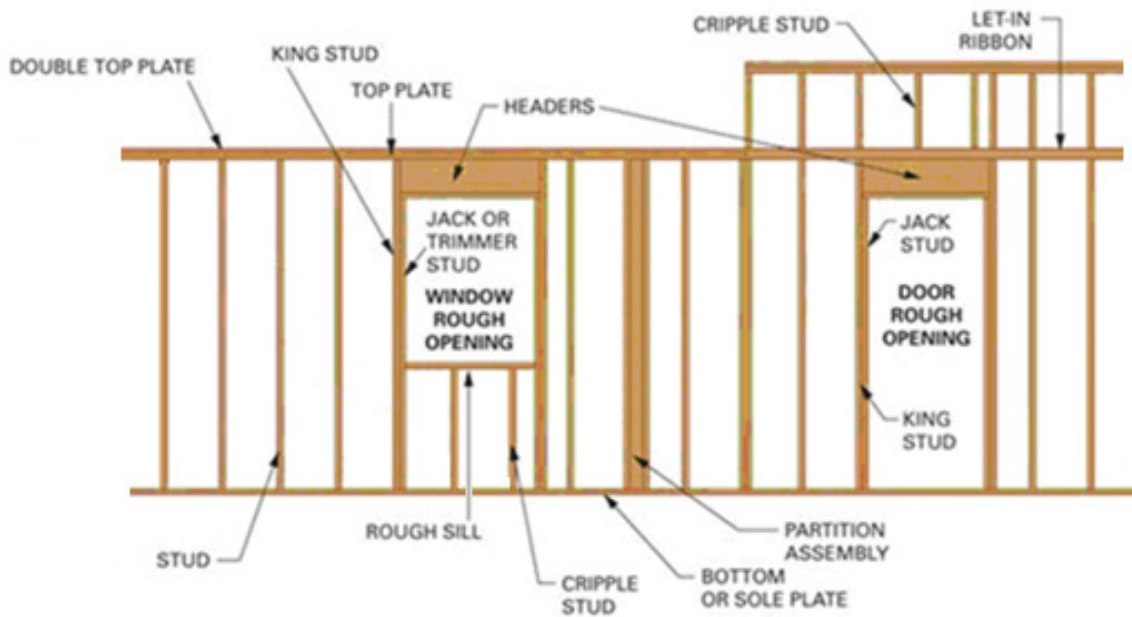
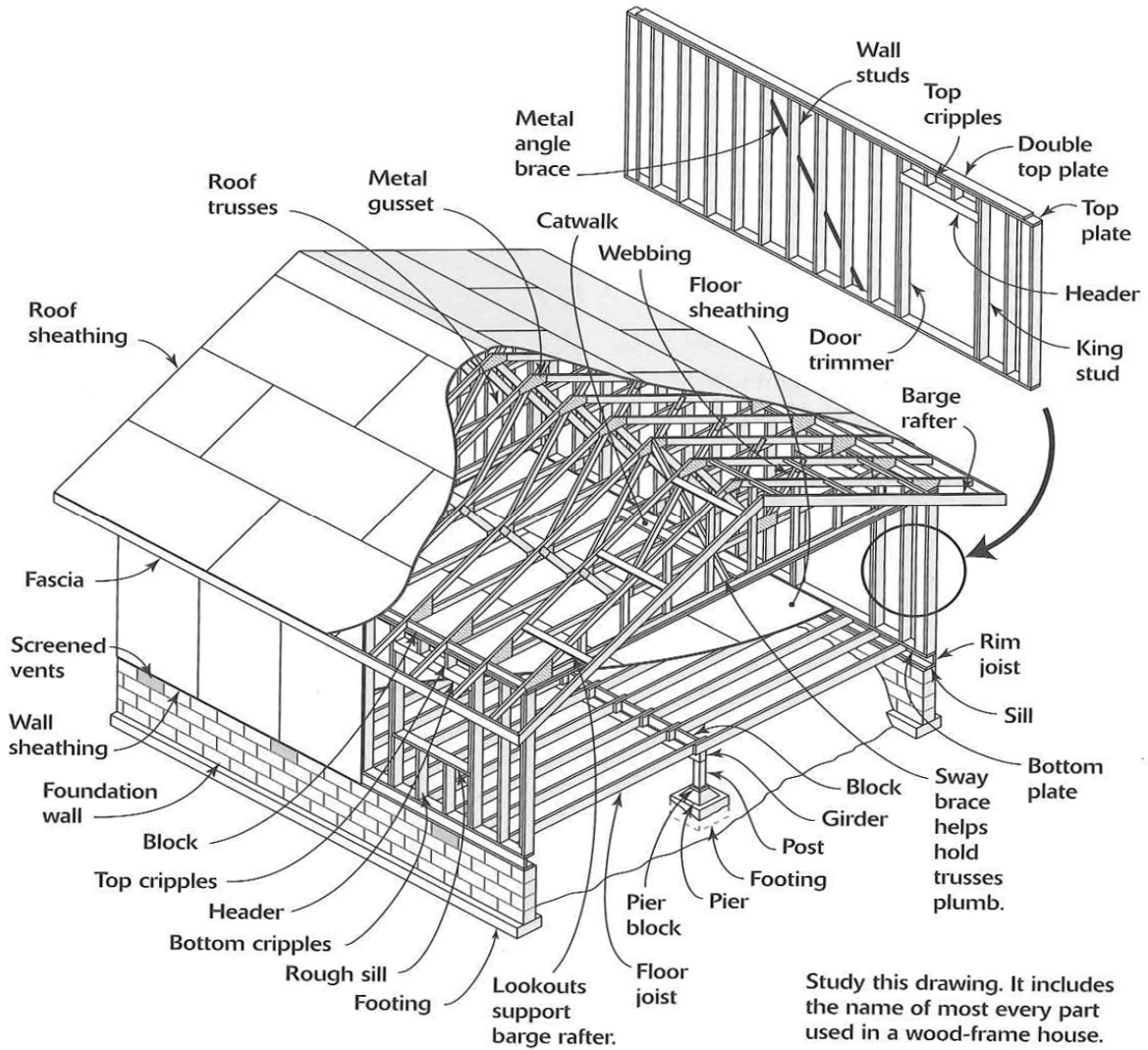
- Stairways with 4 or more risers or which rise more than 24” must include handrails at 30” –38” high from the plane of the treads.
- Take precautions when climbing onto or off of the roof. This is when many roof related falls occur.
- Do not step backwards on a roof. Every year, experienced roofers fall off the roof by stepping backwards off of the edge.
- Loose materials and sawdust should be removed frequently from the roof surfaces.
- When standing up walls, make sure there are enough people to hold up the wall, and have bracing ready so it can be fastened as soon as possible. Workers should not be positioned on the outside of the wall.
- Make sure the wall is fully supported until the bracing is up.
- Never work on the roof alone.

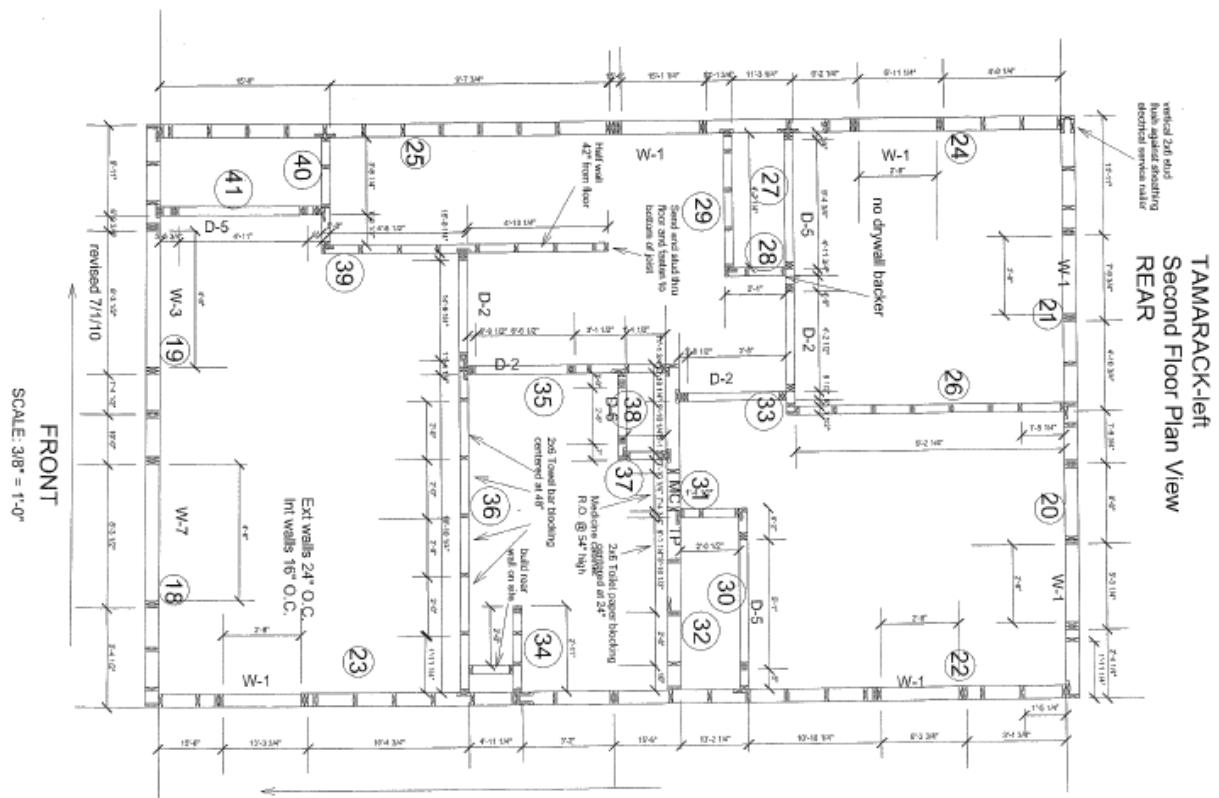
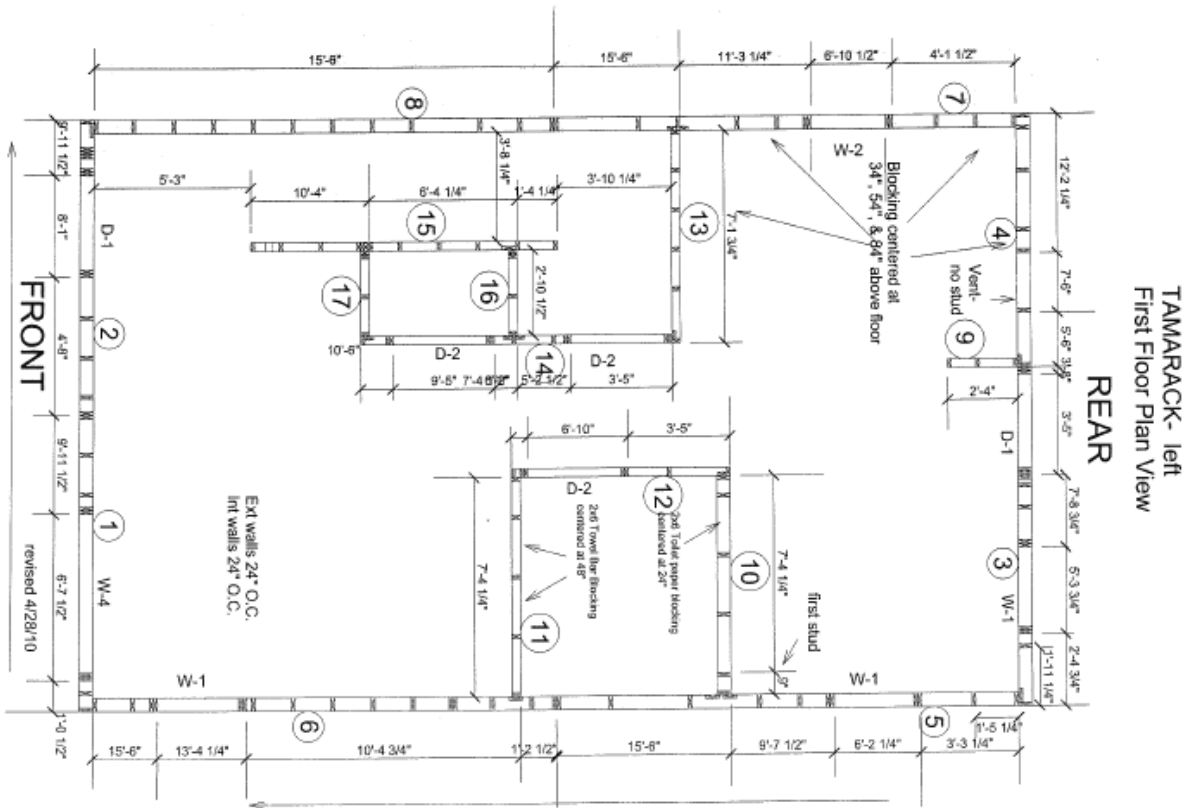
READING A TAPE MEASURE

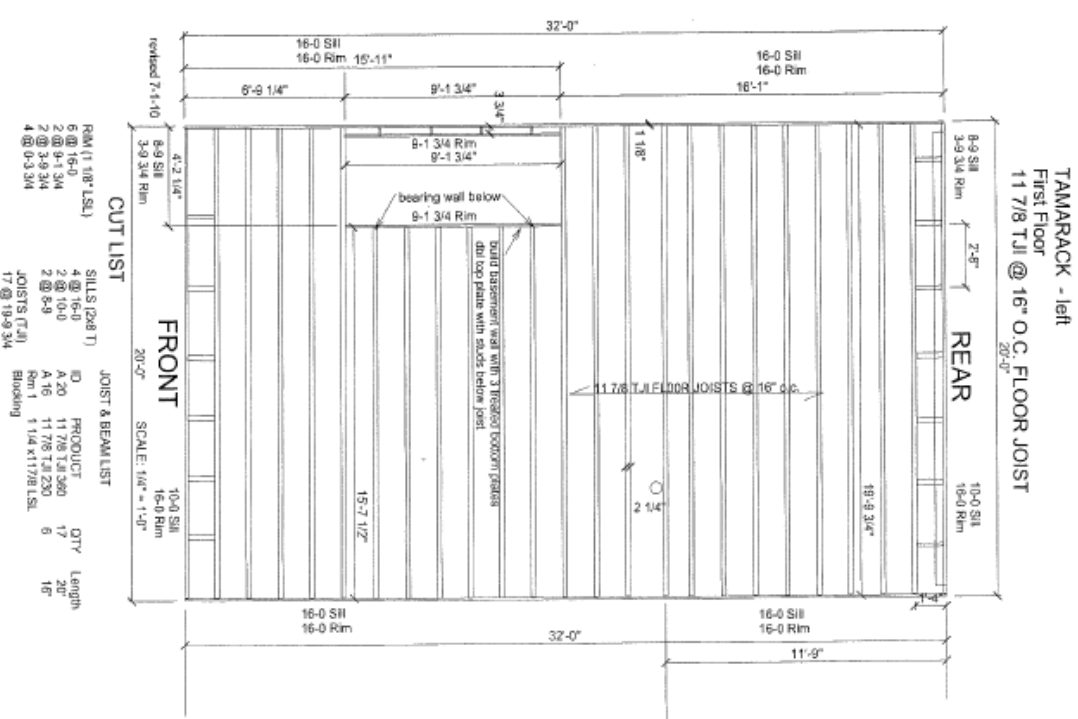


It's important to know at a glance what the different marks on a tape measure mean. Practice using a tape so your measurements will be accurate.

PARTS OF A HOUSE





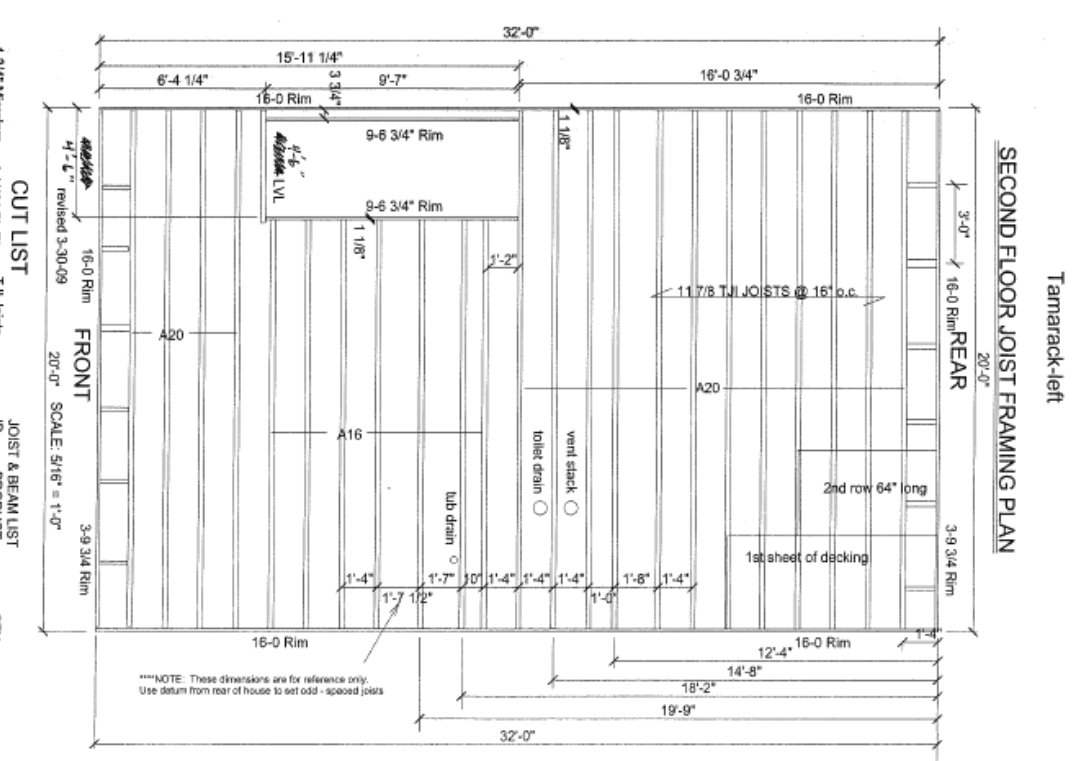


CUT LIST

QTY	DESCRIPTION
6 @ 16'-0"	RAM (11 7/8" LSL)
2 @ 9'-3 3/4"	
2 @ 9'-3 3/4"	
4 @ 9'-3 3/4"	
2 @ 10'-0"	SILLS (2x8 T)
2 @ 9'-9"	
17 @ 19'-9 3/4"	JOISTS (TJI)
8 @ 15'-7 1/2"	

JOIST & BEAM LIST

ID	PRODUCT	QTY	Length
A 20	11 7/8 TJI 360	17	20'
A 16	11 7/8 TJI 230	6	16'
Rm 1	1 1/4 x 11 7/8 LSL		



CUT LIST

QTY	DESCRIPTION
1 @ 1'-6" Microbeam	
1 @ 4'-6" Microbeam	
4 @ 3'-3 3/4"	
1 @ 1'-4" LSL Rim	
6 @ 16'-0"	TJI Joists
2 @ 9'-3 3/4"	
2 @ 9'-6 3/4"	
4 @ 3'-3 3/4"	
16 @ 19'-9 3/4"	TJI Joists
7 @ 15'-7 1/2"	
1 @ 1'-6" Microbeam	
1 @ 4'-6" Microbeam	
1 @ 1'-4" LSL Rim	
6 @ 16'-0"	TJI Joists
2 @ 9'-3 3/4"	
2 @ 9'-6 3/4"	
4 @ 3'-3 3/4"	

JOIST & BEAM LIST

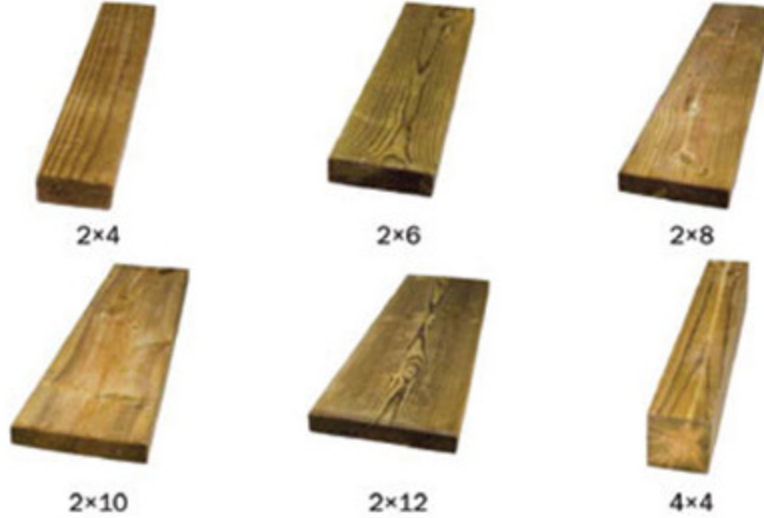
ID	PRODUCT	QTY	Length
A 20	11 7/8 TJI 360	16	16'
A 16	11 7/8 TJI 230	7	16'
TS1 - 6	1 3/4 x 11 7/8 LSL	1	16'
Rm 1 - 16	1 1/4 x 11 7/8	8	18'

****NOTE: These dimensions are for reference only. Use datum from rear of house to set odd-spaced joists

Types of Lumber

(These are the most common types and sizes used by MHH)

FRAMING LUMBER



I-Beam



LVL (Laminated Veneer Lumber)



Tools commonly used when framing

Claw Hammer



Rip Hammer



Framing Hammer



Utility Knife



Wrecking Bar / Crow Bar



Cats Paw



Level



Wonder Bar / Pry



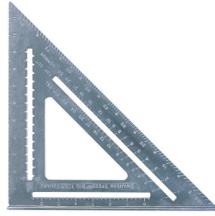
Tape Measure



Chalk Line



Speed Square



Carpenters Square



Miter Saw / Chop Saw



Circular Saw



Reciprocating Saw / Sawzall



Measuring Exercise:

Measure the corresponding pre-cut pieces of wood and write your answers below

A:

B:

C:

D:

E: