

# Framing

## **Framing Of The American Ingenuity Dome**

**How are interior walls attached to the dome shell?** Where ever an interior wall butts up to the dome shell, a metal stud is glued against the shell with spray foam. This way there is a 2x4 cavity to screw the tops of the metal studs into and gives an edge on the metal stud to screw the wall board to. Then an elastomeric caulk or resin paint fills in the area where the shell meets the wall board. Or install a trim board.

### **How are second floor joists supported?**

- Most often the second floor joists are set on top of the first floor load bearing walls, the same as in conventional framing. In areas where additional support is needed, or where there are no first floor walls, microlam beams can be installed and or parts of the second floor may be hung from the dome shell in specific locations by anchoring a 5/8" threaded rod vertically into the concrete of a seam.
- Some of the weight is suspended by threaded steel rods which anchor into the concrete seams and extend vertically down into the dome. Over 3,000 lbs. can be supported by a 5/8" threaded rod suspended in one of the concrete seams. The location of the suspension rods is determined by your floor plan selection. The Building Plans will show the suspension rod's positioning.
- The suspension rod with nut sets on a 3"x6" steel plate, which is embedded in the concrete seam. The seam is reinforced with #4 rebar & two layers of galvanized steel mesh. These suspension rods and plates can be purchased from American Ingenuity.
- After the first floor is framed in and the drywall is attached to the interior framing, the first floor walls make the second floor very rigid.
- For areas that require bracing plywood is installed in the framed entryway walls and on the first floor and second floor interior walls.

## What is needed to frame first floor walls?

### Materials And Tools:

- Door, folding closet door, bath tub and shower module dimensions
- 2"x4"x 8' pressure treated lumber
- 2"x4"x8' standard lumber (kiln dried Southern Yellow Pine or White Wood for all studs including load bearing walls. For economy you can use 92 5/8" long stud lumber for load bearing walls, they cost less than standard 96")
- 16d common nails
- carpenter's pencil
- 2 saw horses
- electrical circular saw
- chalk stick
- Great Stuff Minimal Expansion Foam Sealant
- nailing apron
- 2 ½" fluted masonry nails (or a rented handheld, hammer triggered concrete nailing gun)
- Shells and concrete nails for safest, cleanest, fastest attachment of bottom plates.
- Doors should be ordered from the supplier. Plan ahead as there may be delivery time involved. Doors on hand provide you with the exact measurements for rough openings in framing.
- Select bath tubs, shower modules and such now, and obtain framing dimensions.
- If you plan to install an oversized item such as a Jacuzzi, which is wider than a standard door opening, put it inside the area to be framed right now. Keep it in its shipping carton for protection during wall framing.

## **Build The Internal Walls – See your Building Plans for exact specs.**

- The exact location of the rough plumbing stub outs determines the actual location of the internal walls. If the stub outs were moved a bit during concrete pouring, the wall location has to be adjusted accordingly and may differ slightly from the plan.
- Measure wall dimensions, cut plates and studs. Wall height from concrete foundation to top of top plate to be 8'-1".
- Bottom plates to be pressure treated. Bearing walls to have double top plates. Top plate members must overlap 24" at breaks.
- Rough door openings to be door width  $W+2"$  and door height  $H+2"$  (door rough height is generally 80", unless a nonstandard door will be installed).
- Assemble the wall component lumber by laying it out on the flat concrete floor foundation and toe-nailing it perfectly square.
- Double check dimensions and squareness and, if satisfactorily, righten the wall to the vertical position.
- Move the wall into its position to where it touches the wallboard of the dome shell.
- Mark the location of a wall stud on the wallboard
- Carve out a 3" deep cavity into wallboard and foam and extend a 18" long 2x4 cut off upwards from the wall stud into the cavity. Attach the stud extension to the stud with deck screws and fill the cavity around the 2x4 in wallboard and EPS with expanding foam. This makes for extra stability of the wall at the dome shell junction.
- Finally, inject Great Stuff Minimal Expansion Foam Sealant into all open spaces between wall lumber and wallboard at the dome shell.

## **FRAMING OF THE SECOND FLOOR**

- Gather the necessary materials and tools.

- Simpson LS 70, Simpson LUS 28 (can be purchased from Ai.)
- Steel U-channels 3"x 1 ½" x 6" and suspension rods (purchase from Ai.)
- 5/8" nuts and washers for suspension rods (purchase from Ai.)
- Joist lumber (2"x 8" or 2" x 10", per plan)
- Edge beam lumber
- 16d x 3" and 16d x 1 ½" nails
- Framing square
- 25' measuring tape
- Hammer
- Level ( or rotary laser level tool)
- Carpenter's pencil, black felt pen
- 2 saw horses
- 8' and 10' ladder
- Circular saw
- 1 ea. open and box wrench for 5/8" nuts
- Tie wire
- Carpenter clamps
- 1" wide wood chisel
- Utilize cleaned up form boards of the same size as joist sizes in Plan S-5.
- Bend support rods into plumb position as good as possible.
- Measure distance between suspension rods horizontally at the dome shell not at their lower end.
- Suspension rods tend to point uncontrolled into off plumb directions before

they are connected to the second floor edge beams.

## **Build The 2nd Floor Edge Beam – Refer to your Building Plans as they take Precedence.**

Measure and cut edge beams according to plan, using the measurements obtained from between the rods.

Outside of the beams are slightly longer than inside Length. (see detail plan S-5)  
All perimeter edge beam ends are cut at an angle to achieve maximum support surface from the supporting U-channels.

Edge beam bottom corners are notched out  $1 \frac{3}{4}$ " high from bottom of edge and  $3 \frac{1}{2}$ " from beam ends, where they will rest on the U-channel. Secure temporary, but effectively for safety purposes, the edge beam to both the U-channel AND to the rod with tie wire.

Mark all suspension rods all around with black felt pen at  $8' - 2 \frac{3}{4}$ " up from the concrete floor.

Slide U- channel from bottom end up the rod (channel legs pointing downward) until its top surface is at the level of the mark. Slide and turn a washer and a two nuts up the suspension rod thread to support the u-channel in its position. Later secure nuts with locktite. Repeat this with all suspension rods.

Nail two boards of lumber together to form the first edge beam. Lift the beam onto the U-channels, half of the U-channel supporting the Edge beam as shown at SUSPENSION ROD DETAIL 2 on plan S-6.

Continue around perimeter by placing and temporary securing the next edge beam.

Nail a Simpson LS70 connector to the outside joint of the two beams, after hammering the angle of the LS70 more open to fit the angle of the joint.

Continue to complete the edge beam perimeter.

**CAUTION**

At this construction stage, some components are loose and flexible and prone to slip and fall at the slightest disturbance. Be extra careful. Declare the area under the beams off limits and have everyone wear a hardhat.