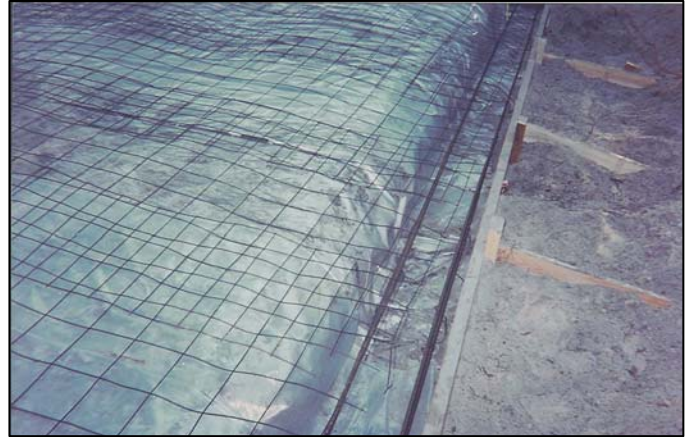


*The following is a detailed description of the construction methods used to build the Ryan Music Inc. recording studio.*

## **Foundation:**

The building's 576 square foot monolith concrete slab foundation measures 18'-0" wide x 32'-0" in length. The monolith slab has 18"x16" footings reinforced with 2 continuous #5 steel re-bars, and 6"x6" 1.4 wwm (wire mesh) was added to the 4" thick fibermesh concrete slab for additional reinforcement. Picture at right shows detail of foundation footer and slab, with 6 mill vapor barrier, formed and ready to pour. 3000 psi fibermesh concrete was used to pour the foundation.



Steel re-bar up-rods were imbedded vertically in the concrete at min. 32" centers around the perimeter of the slab at the time of the pour. These steel rods will help to anchor the concrete walls to the slab and foundation. The placement of the steel rods must be carefully planned to allow for proper alignment with the wall forms that will be placed over and around them during the wall construction phase.

After the foundation has been poured, the construction of the walls begins by layout of the guide lines for the interlocking foam block wall forms. The EPS (Expanded Polystyrene) foam block forms which will be installed around the perimeter of the concrete slab measure 8" wide x 12" high X 48" long, and fit together like "Lego's" to form a continuous interlocking wall form which will then be poured solid with concrete. Unlike most concrete forms, these block forms will remain in place after the pour and will provide an important insulating component of the finished wall.



## Exterior Walls:

A method of wall construction known as ICF (Insulated Concrete Forms) was chosen for the outer walls. The particular brand of ICF chosen was the POWERWALL® system designed and manufactured by Southeast Walls of Florida. POWERWALL® website: (<http://www.powerwallicf.com>) is an insulated concrete form constructed out of 2lb. density expanded polystyrene. This system is used in the construction of exterior walls for both residential and commercial projects. This method of construction was chosen for the excellent sound transmission class (STC) ratings that are achieved using ICF walls.



Sound Transmission Class (STC) rating is a single number quantifier used to rate walls, doors, and other partitions for their effectiveness in preventing sound transmission. Basically, a high STC rating indicates a more efficient sound absorption characteristic. That said, the typical wood frame wall has an STC rating of 33. ICF walls consistently achieve STC ratings of 55. STC ratings, however, can be misleading because they are based on a logarithmic scale. An STC rating of 50 for example, is not just one better than a rating of 49. An STC rating of 50 should be deemed *twice* as effective as an STC rating of 49.

The lightweight form blocks are delivered to the jobsite in large pre-packaged cubes. The individual blocks measure 8" x 12" x 48" and are assembled by installers skilled and trained in the installation of ICF's. Cutting and trimming of the blocks is accomplished using a special hot wire cutter that quickly melts through the foam blocks.

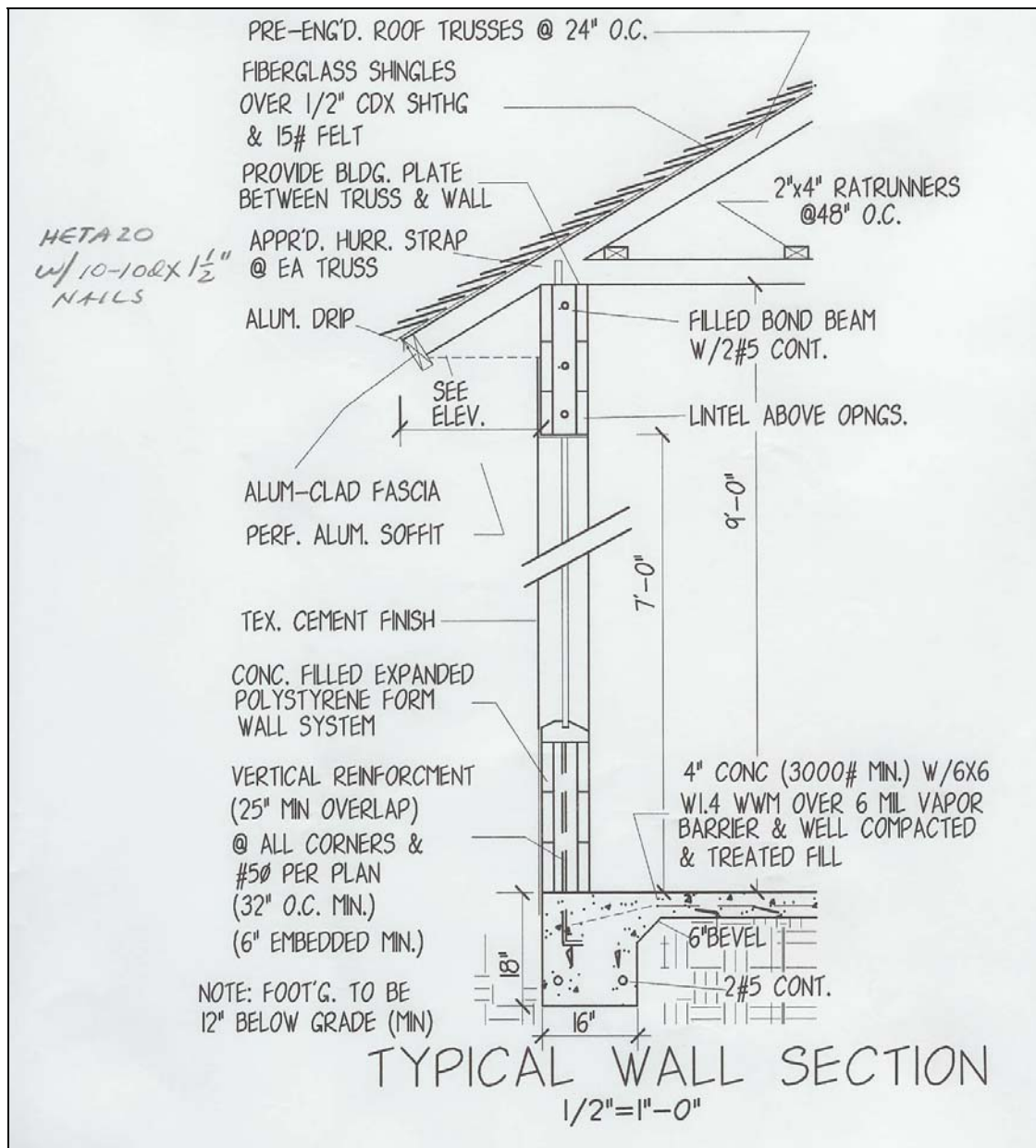


As construction of the wall advances, steel reinforcing rods are added both vertically and horizontally within the center of the foam blocks. These steel rods will form a continuous web of reinforcement to the concrete which will be poured and cured within the foam block walls. The steel rods are doubled on the last course of blocks where the engineered roof truss assembly will be anchored.

After the 9' high walls are assembled, they are leveled in all directions and held in place with steel leveling braces which are temporarily anchored to the concrete slab to hold the walls in place until after the walls are poured with concrete. These forms are then filled solid with 3000 psi concrete and moist cured (slow dried) to over 4000 psi. The finished 8" wide walls provide a Thermal rating of R-18.3, a Federal Thermal Mass rating of R-40, and an STC rating of 55. They will also withstand wind loads of up to 200 mph and impacts of up to 100 feet per second. Note that the gable ends are also formed and poured solid.



**Typical Wall Section Plan:**



## Truss Assembly and Roof:



Several days after the exterior walls are poured solid with concrete, the forms and braces are removed and the engineered roof trusses are set and installed (24" on center) between the two solid poured concrete gable ends. The roof trusses are fastened to steel hurricane straps which are imbedded in the concrete around the perimeter at the top of the exterior walls. The truss assembly is further secured by adding additional bracing and fastening 2x6 sub-facia boards where they reach their 24" overhang at the outside of the walls.



The truss assembly is further secured by adding additional 2"x4" bracing throughout the structure. The entire assembly is finally fastened together by nailing 2"x6" sub-facia boards to the ends of each truss where they reach their 24" overhang at the outside of the walls. The next step is to fasten the 5/8" plywood roof decking to the truss assembly. The 4'x8' plywood sheets are fastened to the truss with "Liquid Nails" adhesive fastener and by nailing to the truss with galvanized 8d nails every 4 inches. Additional steel bracing, hurricane straps, and steel plates are also added at critical points.



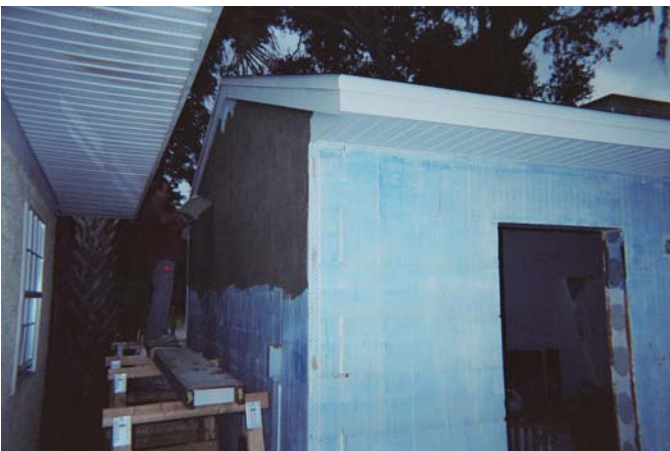
2"x 4" "rat-runners" are nailed to the top side of the bottom cord of each roof truss to strengthen the entire assembly and to add support to the roof structure. After the roof decking is installed, it is time to "dry-in" by installing 40# roofing felt. This will protect the plywood decking and temporarily dry-in the building from the elements until the asphalt roofing shingles are applied.

## Finished Roof and Exterior:



Framing for the base of a decorative cupola is added to the peak of the center of the roofline prior to the installation of the asphalt roof shingles. A heavy gauge aluminum drip edge is also fastened along the perimeter of the edge of the roof.

A heavy weight dimensional roof shingle is chosen for the finished roof. Unlike most conventional roofs, no roof vents are installed due to the leakage of outside sound sources which would occur inside the finished studio. After the roof shingles are installed, the decorative cupola is finished and trimmed.



Aluminium soffit and fascia are installed prior to application of the masonry stucco on the exterior walls. A blue tinted liquid concrete bonding adhesive is applied to the outside of the EPS foam block before the coats of masonry stucco are applied. This insures a secure bond of the stucco to the foam block walls.



A commercial grade fiberglass exterior door is installed, and a concrete driveway, walkways and patios are poured to and around the studio before painting begins.

It is decided that the exterior of the studio will be completely finished before the tedious job of building the inside recording studio will begin. Landscaping will play a major role in the design of the exterior of the studio; therefore the landscaping begins at this point.



An area just outside of the main entry to the studio is chosen for a waterfall and fish pond. The large palms are brought in and planted, and the design of the pond is laid out. Pressure treated dock poles are installed to define the area and to accentuate the flow of the design.

Large rocks are brought in and laid in place over the liner. Exterior electrical receptacles and plumbing for the pump also installed at this point. As work progresses, the pond starts to take shape.





The pond and waterfall are completed and five “coy” fish find a new home under the shade of the trees.

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The exterior of the studio is now completed, and it is on to the construction of the recording studio itself.

## **Isonene Soundproofing Insulation:**



After considerable research, it was decided that the interior or underside of the roof decking on the inside of the studio, would receive an application of a relatively new soundproofing and insulation material known as isocyanate or **isonene**. This expanding foam material, once it is sprayed on to a surface, adheres and expands within seconds to about six inches in thickness. This is ideal for soundproofing applications due to the fact that the foam expands and seals every square inch of surface that it applied to, thus eliminating many of the sources of sound transmission. Unlike many other types of insulating foams, isonene also retains its resiliency and does not harden or crack with age.



The installation of the isonene foam was contracted to a professional firm licensed in the application of isonene, and the process took about four hours. This insulation is the first line of defense against noise intrusion from the outside world which would otherwise infiltrate the confines of the recording studio.

## Soundproofing the Main Ceiling:



The next step in the process of soundproofing was the insulation of the main ceiling. For this, several layers of insulation and construction materials were used. The first step was to lay batts of glass wool or mineral fiber insulation. A popular brand known as Roxul was used. After these 4" thick batts were laid in place, a layer of 5/8" thick "X" or fire rated gypsum sheetrock was screwed to the underside of the "rat runners". Every possible seam and crack was double sealed with acoustical caulk; which will not harden or crack with age. A second layer of batt insulation was then sandwiched underneath the layer of drywall, and plywood strips were nailed to hold the insulation in place for the next step.



Extra care is taken to seal every possible hole, crack, and seam. Even the smallest gap can allow unwanted sound to enter. A recording studio must be sealed as tight as a submarine: if water can get in, so can sound. The multiple layers of material also help to absorb different frequencies of sound.