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Questions related to specific materials, methods and services will be addressed at the conclusion of this presentation.



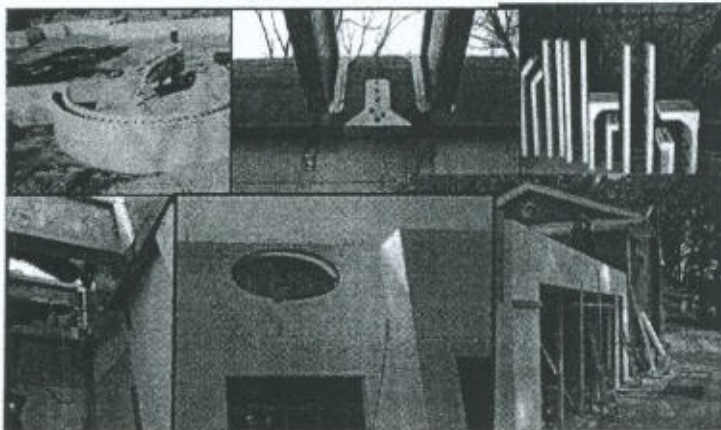
Learning Objectives

Upon completing this program, the participant should:

1. Recognize the systems and field practices of ICFs that will bring you success
2. Learn systems and field practices for bracing and shoring, scaffolding, window/door openings, reinforcing and embedments
3. Understand details regarding placing and vibrating concrete; integrating floor, roof and finish treatments



World of Concrete – 2008 How to with ICF's...



ICF's WOC '08 -> Types, Tips, Tricks



In an effort to understand ICF's we must first identify the various types from a manufacturing stand point, performance, preparation before and during job-site commencing; While most ICF's have varying degrees of advantages over others make no mistake all ICF's when installed in accordance with sound prescriptive methods, Engineering and a ton of common sense, you will continue to succeed with any and all product types.

ICFers, TYPES~!!



- The ICF industry started out as an EPS panel system, with various extruded and/or expanded polystyrene insulation boards cut to spec, delivered to site with various types of plastic inserts, that evolved into special formed panels with strong density board strengths and R-values with upgraded inserts to out perform early woes of concrete blow-outs and bowing/bulging walls...

Modern Types: Vertical ICF's



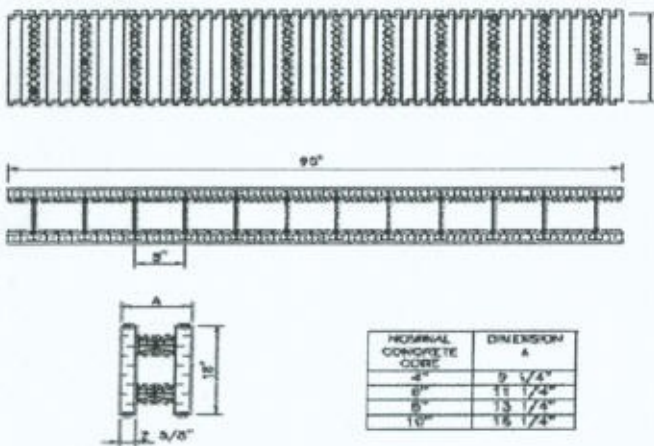
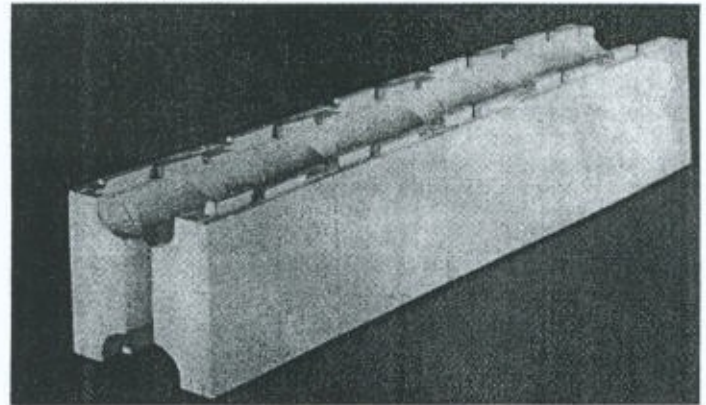
ICFer's Modern types...

- Collapsible Fold Form, Full Form, Vertical Tilt-up... ALL EXCELLENT DESIGNS~!
- Custom Accessory Forms(45's, 90's, Radius', Brick-ledge, Top Course Forms, Inserts...)

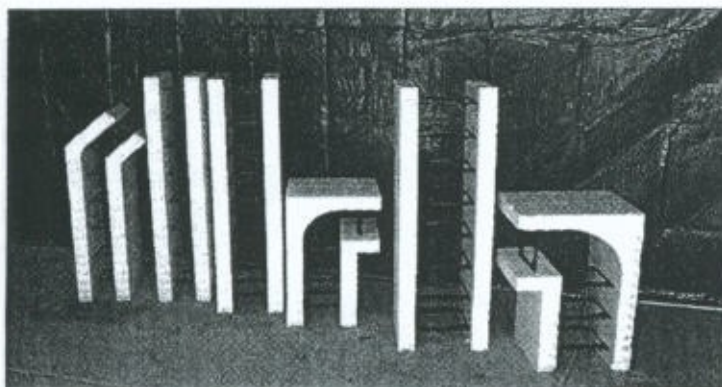
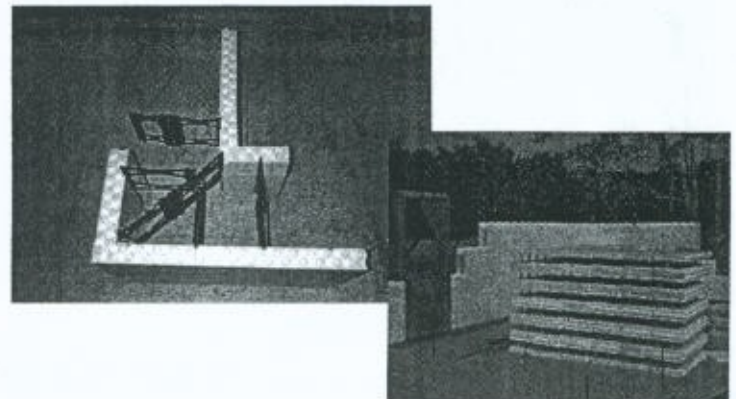


ICFer's Modern types...

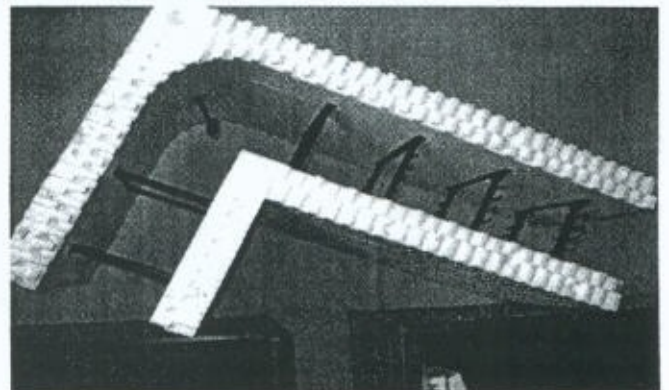
SOLID FOAM FORM...



Collapsible/Form-tie Insert Forms:



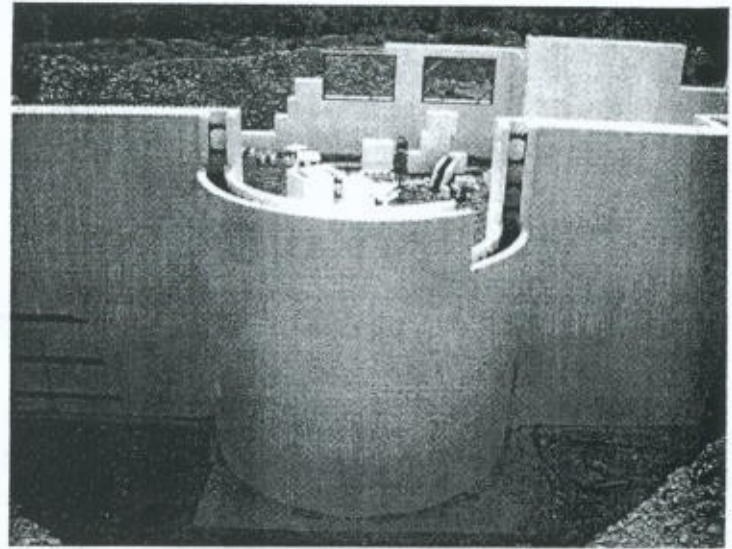
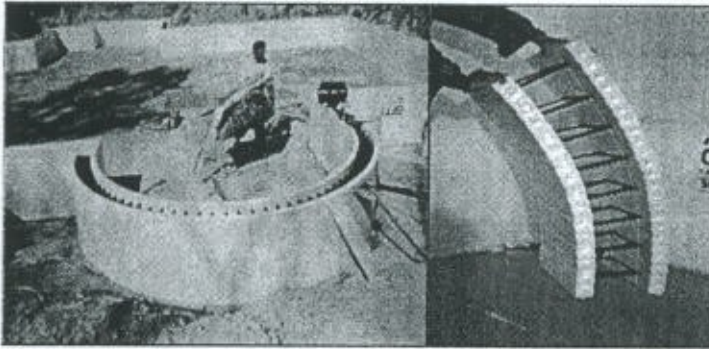
Custom 90 degree corner, showing external plastic dowel placement and re-bar placement holder for positioning corner reinforcement...



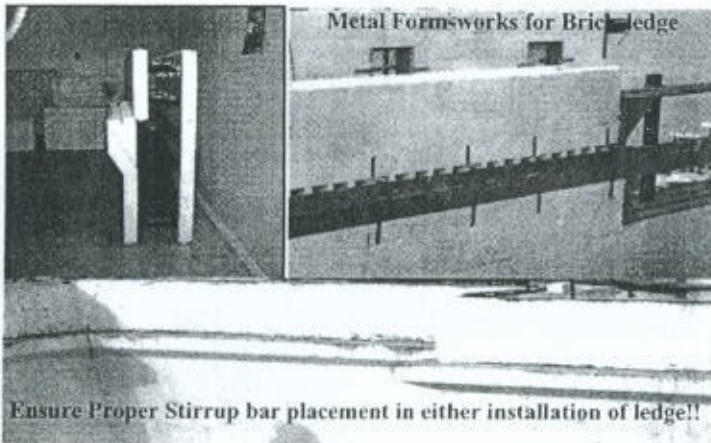
Every System; Panelized-Vertical&Horizontal, Collapsible, Fold Form, Full Form Systems have integrated cavity types to accommodate 4", 5", 6", 7", 8", 10" ++ concrete pours to both Aci and ICC codes standards; Some with unique reversibility characteristics for job-site K.I.S.S. Rules...

RADIUS FORMS

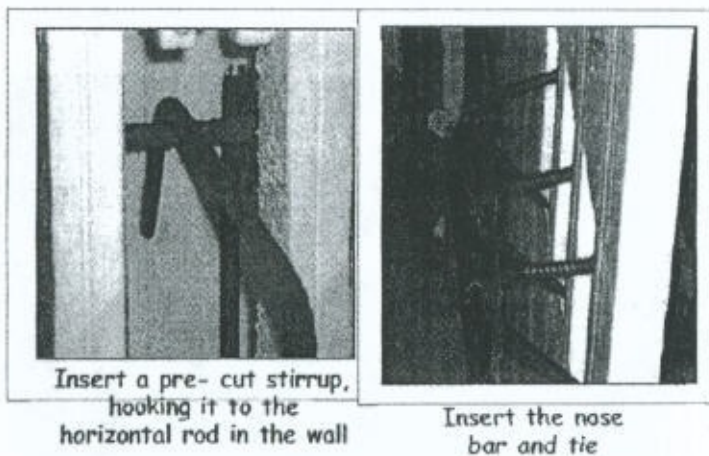
Computer cut radius forms down to a 5'6" radius direct from the factory and or cut on site with various hot knife attachments and angle saws...



PRE-MADE Brick-ledge forms



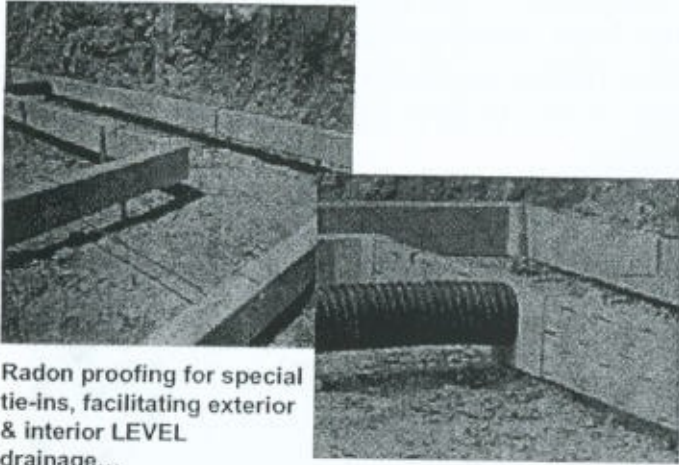
STIRRUP PLACEMENT QUICK LOOK



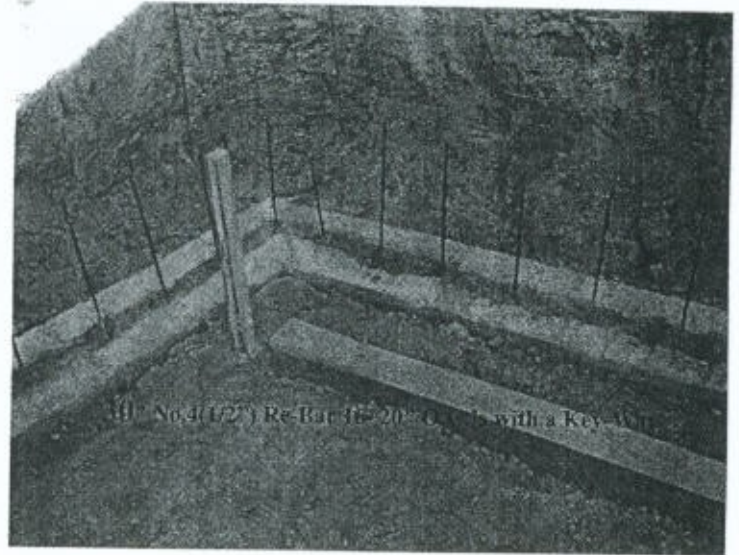
GETTING STARTED: Footings

Starting with good, level footings will make the start of your ICF project much easier to manage when coming to the square, level and plum stages. Certainly using conventional lumber framing is a start, however unless you are 100% certain of your wall placement on the footing, reside from placing the 30", 16-24" O.C. re-bar into the setting cement. You can place these bars after your starter courses are leveled and subsequently hammer drill them into perfect placement...

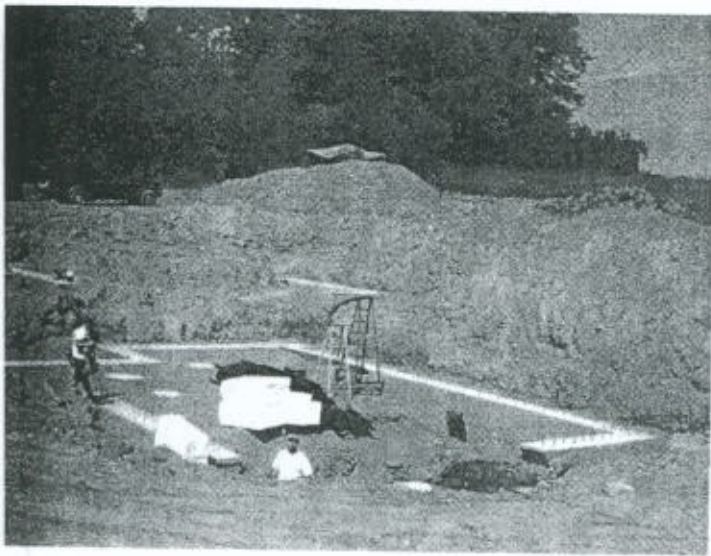




Radon proofing for special tie-ins, facilitating exterior & interior LEVEL drainage...



#1 No.4 (1/2") Re-Bar @ 20" O.C. with a Key Wall



Re-Bar What type, Where, How Often???

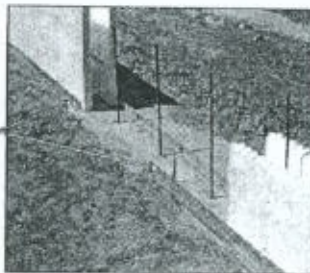
- Size the rebar needed for the job application.
 - Based on:
 - size of wall
 - amount of backfill
 - height of wall
 - fluid pressure of backfill material
 - rebar grade
 - This can be easily found in your structural manual or Prescriptive Methods

Once ALL the Footing Re-bar has been placed, commencing laying your wall starting from the corners, measuring your panel size or full form system full width to accommodate proper wall placement with a chalk-line, wood strapping OR...

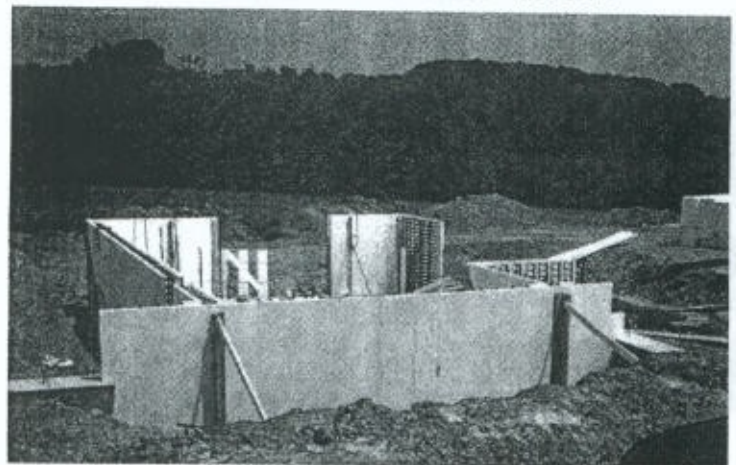


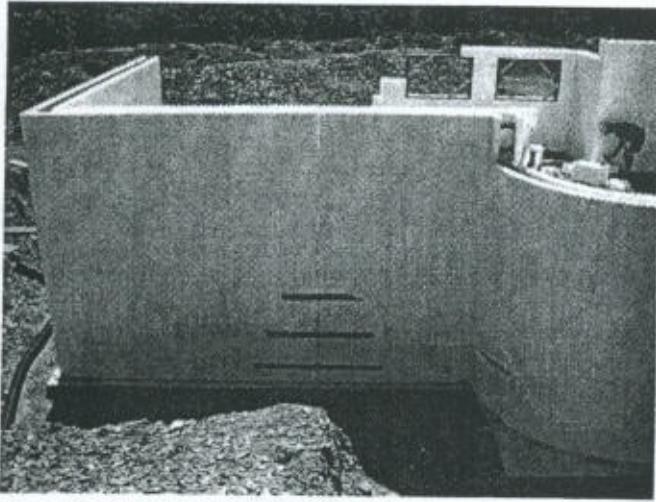
Another option is a 2 1/2" metal track anchored to the footing on the outside only and the forms placed inside it.

metal track

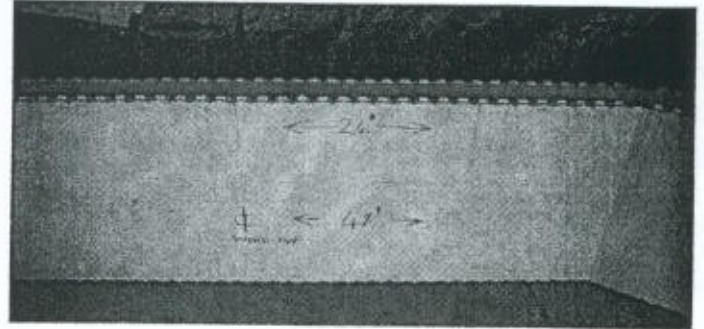


Corners to each center wall...





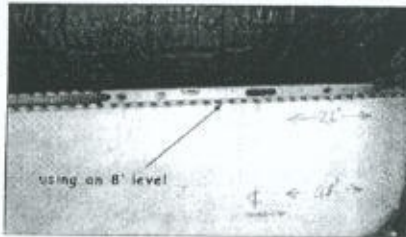
- Clearly mark the size of the cut on the cut form showing directions of the cut; Also future markings of windows or doors help in the build and keep your cut person sharp...



Check the walls for level, square and plumb

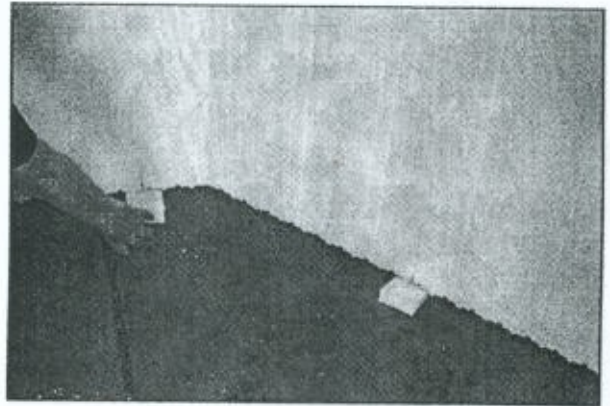


using a
rotating
laser

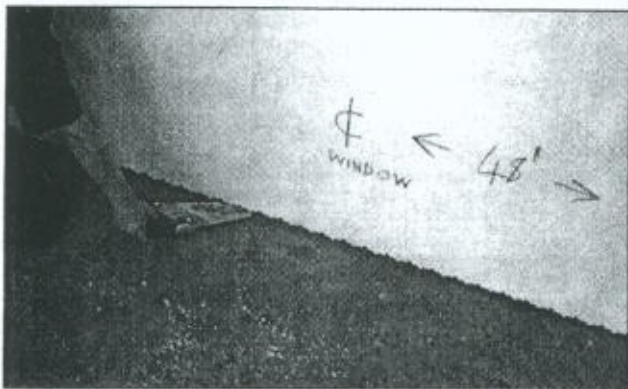


using an 8' level

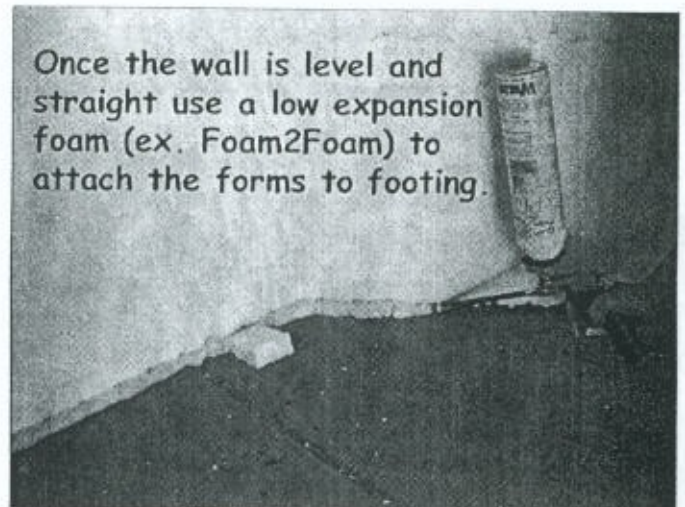
Shim the forms up where low.



Cut the forms where high.

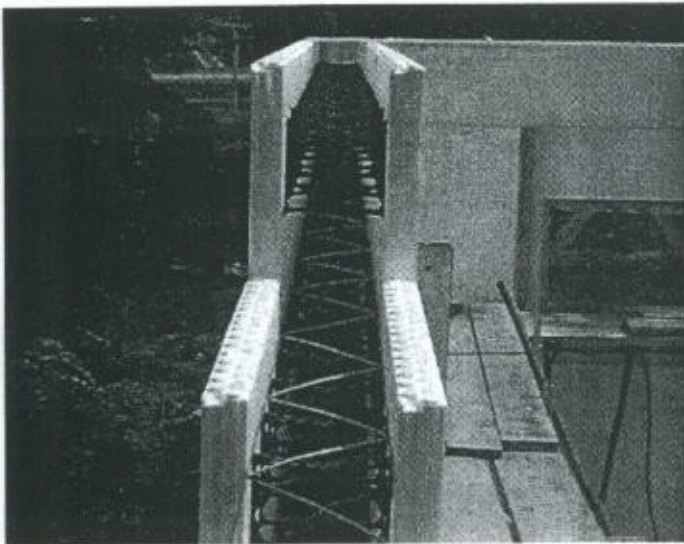
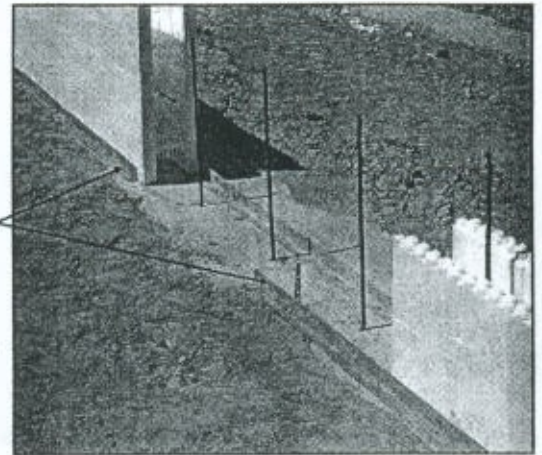


Once the wall is level and straight use a low expansion foam (ex. Foam2Foam) to attach the forms to footing.

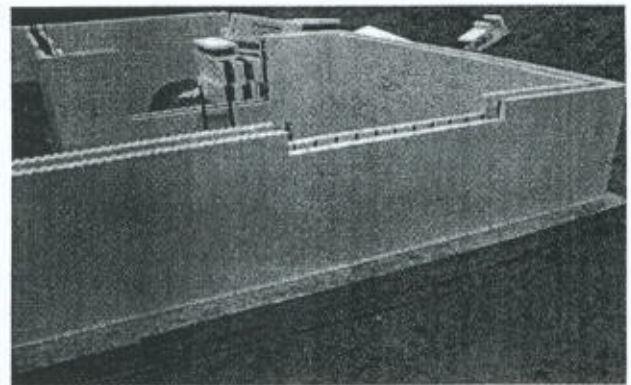




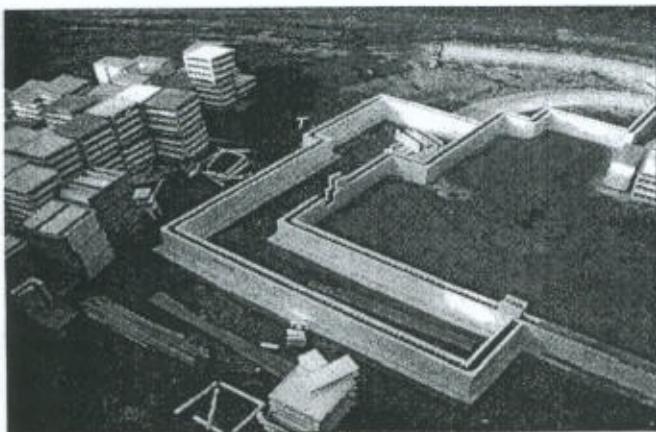
Popular technique again is to use metal tracking studs to isolate your inside & outside forms from moving, however the wall must still be Leveled & Square...



Square, Level, Plum, Seal, PLAN~!
START Building YOUR Wall..

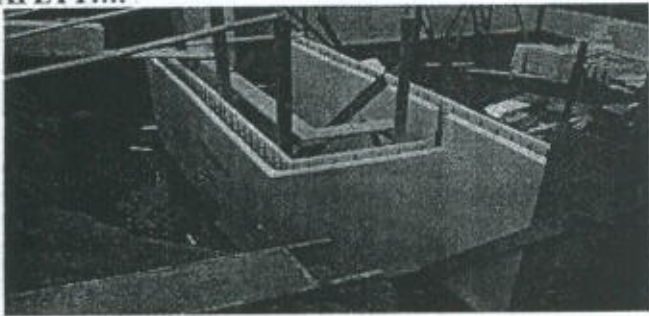


LET's BUILD w/ICF's

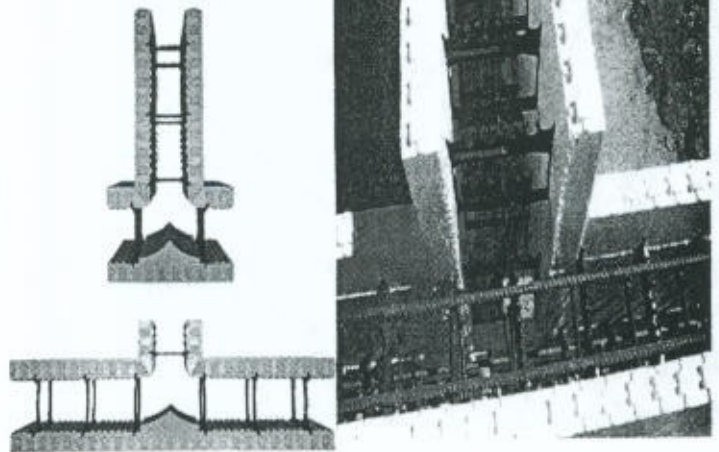


Squaring & SUPPORTING your corners at the starter course stages is also crucial; Ensuring quality workmanship early in the build and NOT scrambling 6 or 7 courses high for adjustments...

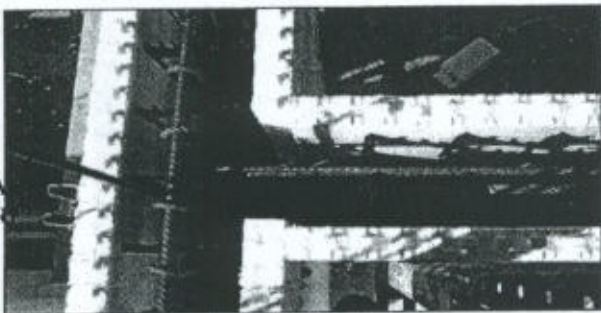
Same methodology for the rest of the build, continue with our two corners building towards the center of each wall with the common splice to the center of the wall, with adders as your friends until your ready for your tagging/bracing system for the top courses; SAFETY, SAFETY....



TEE/TIE-IN Walls-How to...

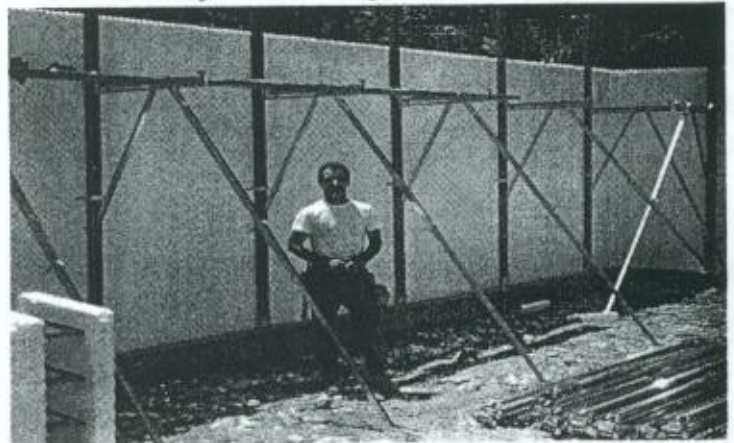


Brace backside of adjacent wall, tying proper re-bar placement, horizontally, bending into 90 degrees



Extra bracing needed on back of T-walls.

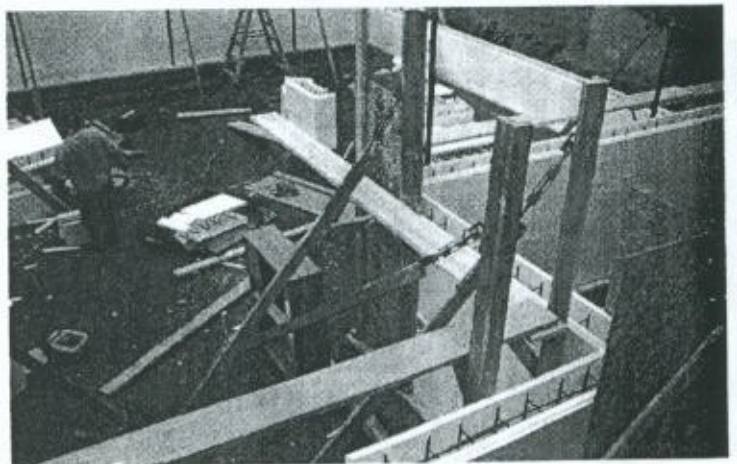
Second to last or Final Courses:
Ready for Integral Bracing...



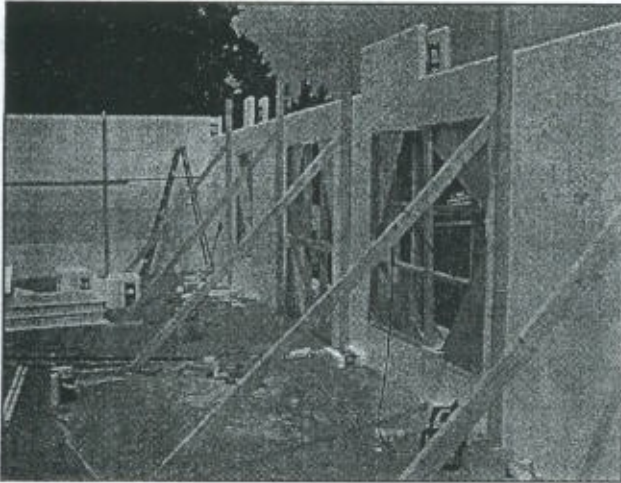
Bracing the Walls

Types of Bracing	Methods of Attaching the Turnbuckle
• Wood or temporary bracing • metal • PlumWall	• screws • concrete screws • wood blocks glued to slab (radiant heat) • Nails • wood stakes through the center the center and screws

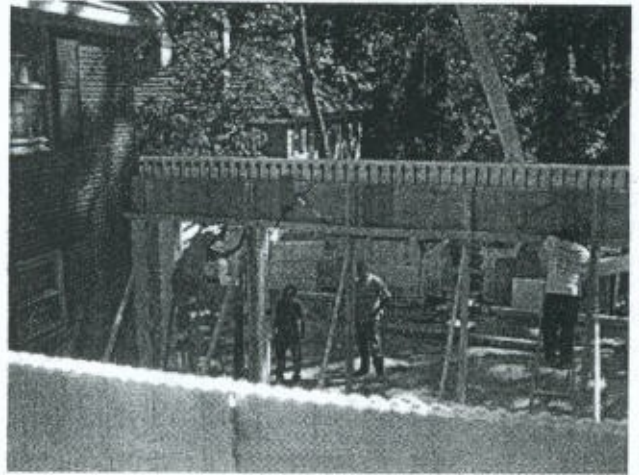
BRACING-Types, Where & How Often??



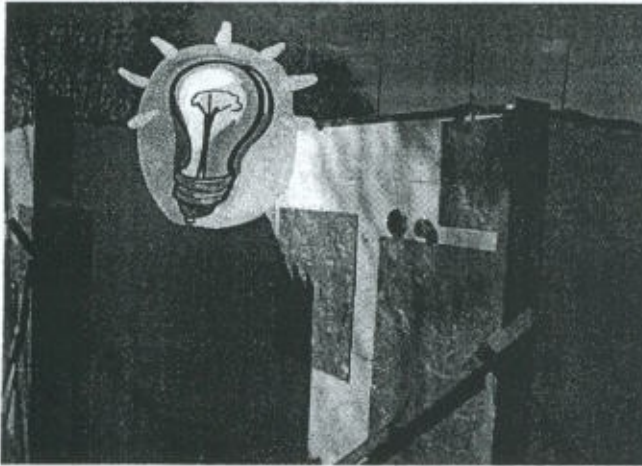
Wood Bracing System



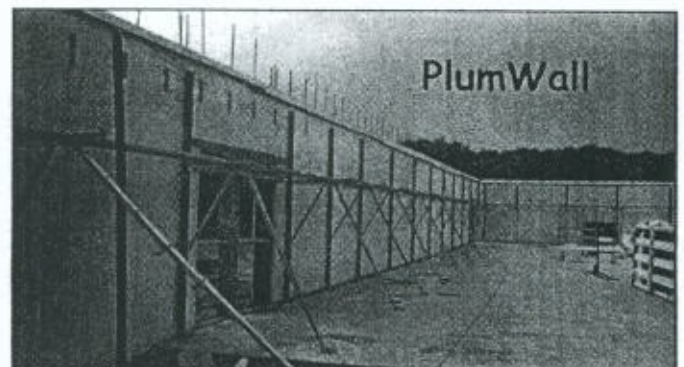
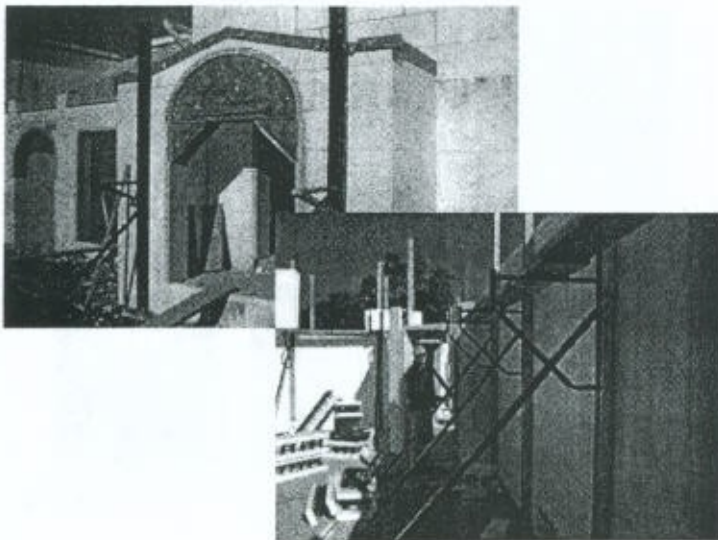
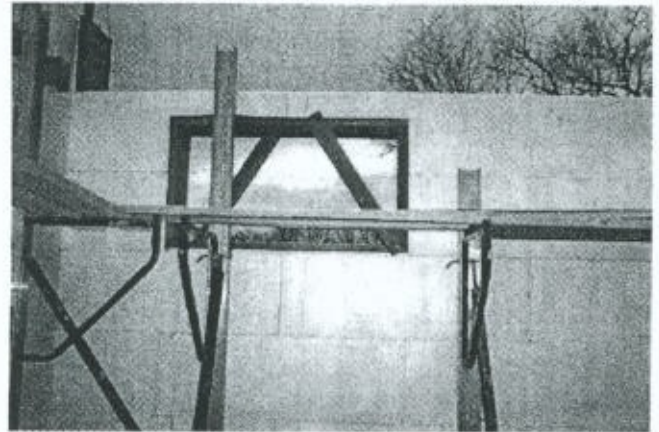
Headers for LARGE openings can be built on the ground, supported by Lumber supports until mechanically fastened into place & braced.



Corners Support-Crucial on long run walls-DO IT ANYWAY-!

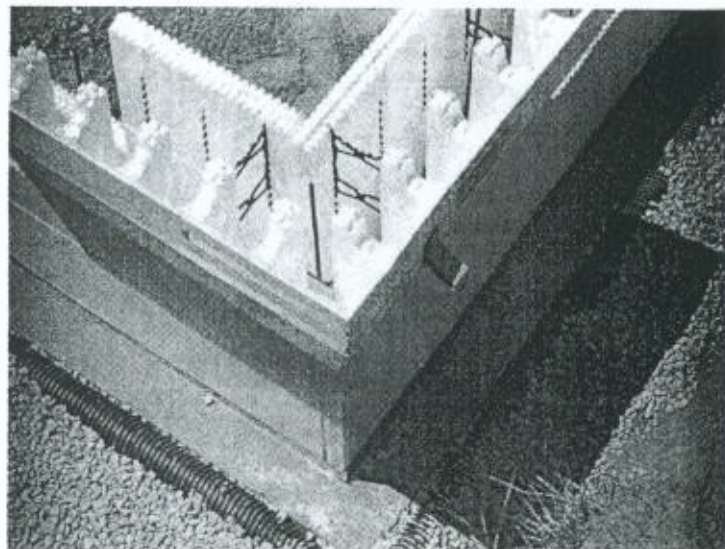
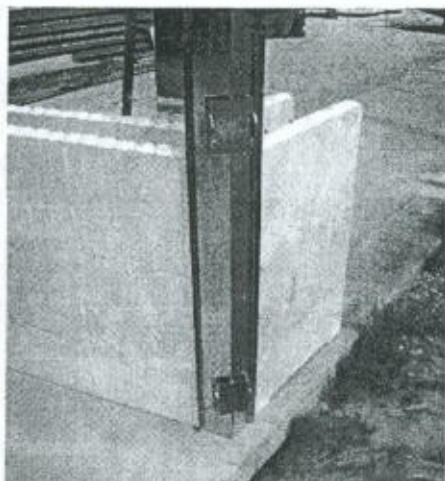


Three Component Metal Braces -> Strong Back w/Platform & Turnbuckle

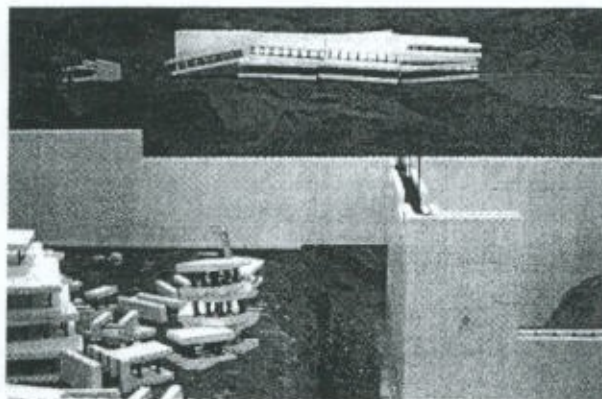


The bracing should be placed every 5' to 6' along the wall. By turning the turn buckle the wall can be aligned before and after concrete is in place.

SOME
MANUFACTURE
A CORNER
BRACE WITH
NICE STRONG
BACKS WITH
LATERAL
SUPPORT TURN
BUCKLES &
ASCESSORIES
FOR EASY
INSTALL VS.
LUMBER...



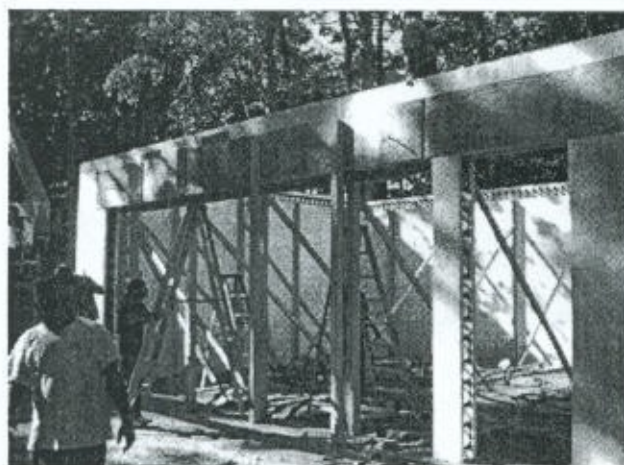
Jump-Walls/Footings...



LUMBER BRACE, AS MUCH AS POSSIBLE & LEAVE IN
PLACE TWO-THREE EXTRA DAYS AFTER CONCRETE
POUR THEN REMOVE, OTHERWISE BACKFIL WITH
SOME SUPPORT IN PLACE IF LONGER THAN 7 FT...



WINDOWS/DOORS/OPENINGS?



NICE! BUT I NEED MORE SUPPORT HERE FOR THIS HEADER!

Ready for Crete? Y/N....?

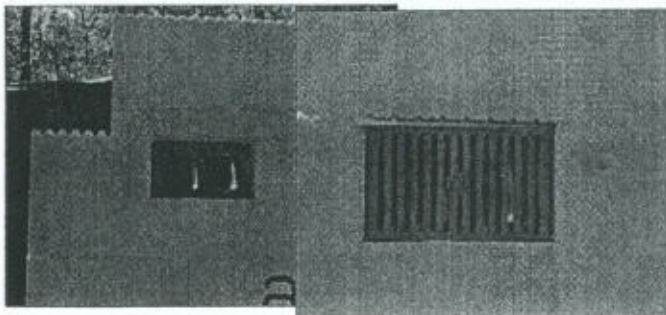


Drop the vertical rebar into the pre-drilled hole or coupling OR keyway. Tie to the last horizontal rebar using wire ties or plastic loop ties.

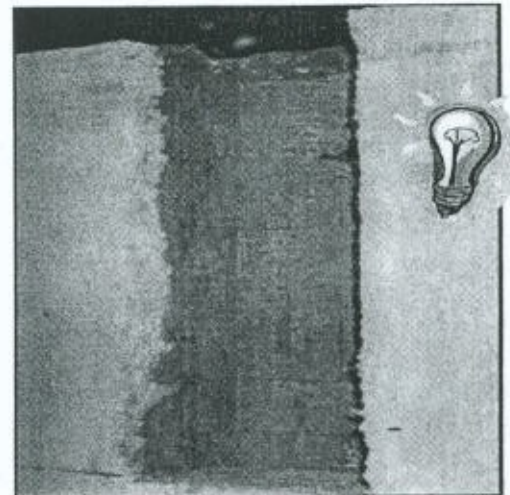


Installing Air Vents

- Place a 8"x16" CMU turned on it's side into the opening.
- Cross over with the top block.
- Place the concrete.
- Cut a 8"x16" opening in the form.
- Install the vent.



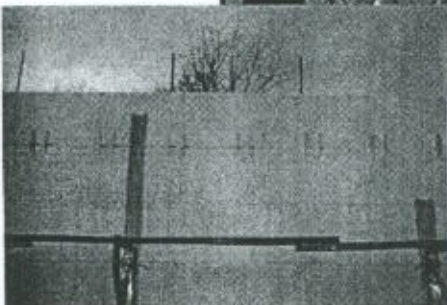
beam
pocket



When planning your job, at the foundation stage REMEMBER your floor joist hangars if it's a complete ICF build or not?



Give the CUSTOMER the list of choices...



Place pipe sleeves into the wall.



Drop corner PVC pipe into the wall.



Ready to pour!

- Call for a wall inspection
- Figure out the concrete needed
 - Length of wall x height (square footage)
 - 4" form – 81 sf/cy
 - 6" form – ?? sf/cy(*1.5)
 - 8" form – ?? sf/cy(*2)
 - 10" form – ?? sf/cy(*2.5 +/-)
- Schedule the pump and concrete

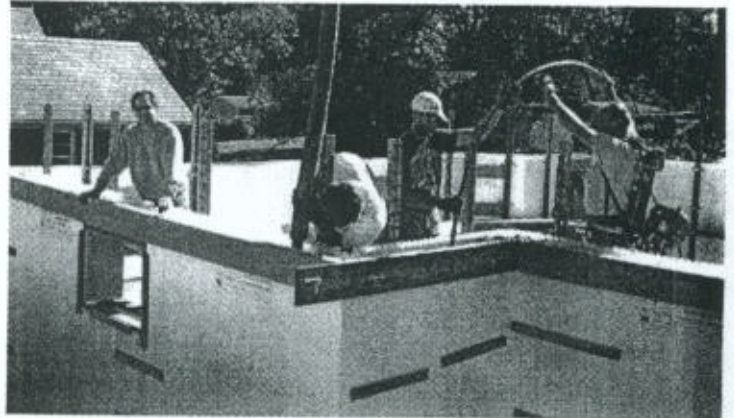
Concrete and Pumping

- Use the suggested ICF Mix Design
- Typical Mix-3,000 psi, 3/8" Aggregate, 5.5-6" slump; STEEL-FIBERS-ask your reddy-mix Rep. first about spec's & \$\$\$\$
- Schedule trucks approx 25 minutes apart
- Request a 5" collapsible hose on end of 5" elbow (best)
- Place concrete in 3' to 4' lifts

COMMUNICATE WITH YOUR PUMP OPERATOR, ABOUT SPEED, ICF PROCESS, DO'S AND DON'Ts!!!



MOST ICFer's have nice radius formed corners to the inside & are very strong; HOWEVER, keep the pump hose 2-3 feet from the corner, taking advantage of that radius to flow your crete in and around those corners, with your vibrator operator 3-4 ft away from pump-hoser...



Waterproofing Systems

Waterproofing Membrane

Perimeter Drain



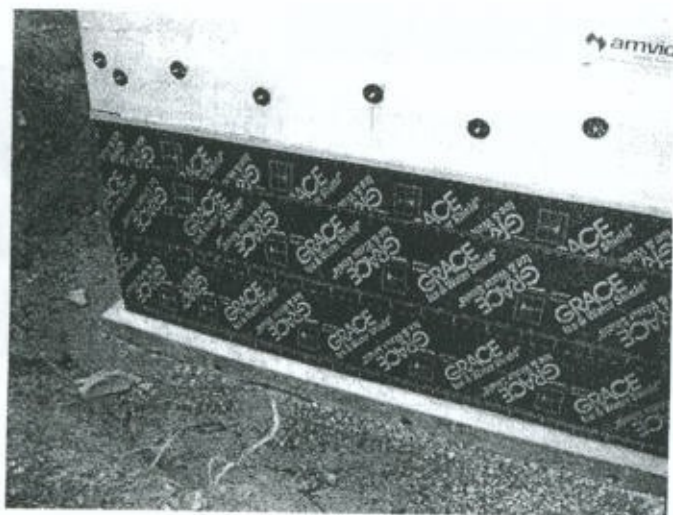
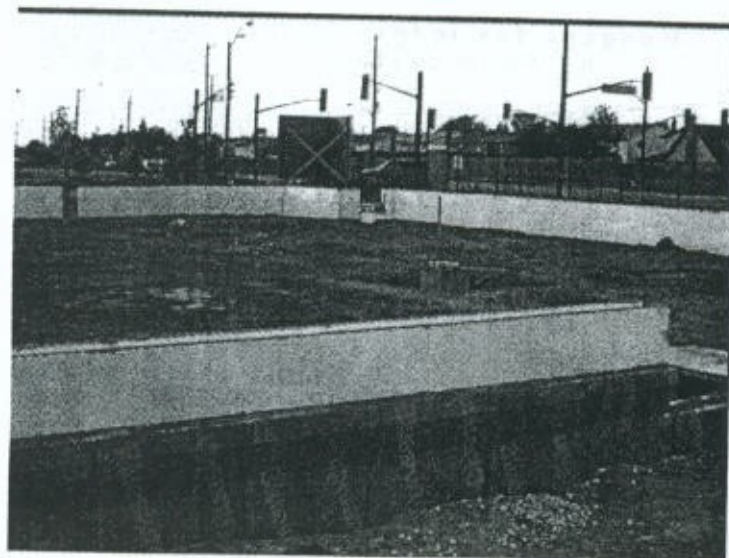
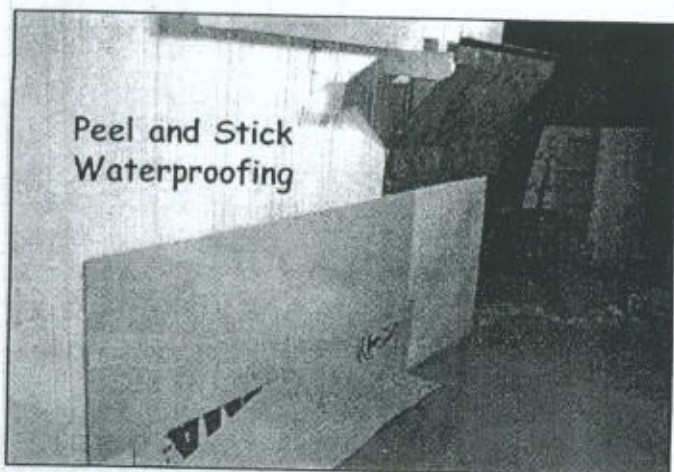
ADDING filter fabric over your ENTIRE stone base at the footing is another terrific detail for foundation success'..

Dimpled Sheetting(Air-gap) technologies,, that are mechanically fastened to most ICF's draped over the footing with nice sealing details at the footing level creating a flood-boot type detail at the base of the wall and footing junction tied in with either peel & stick membranes or liquid applied systems...

SPRAY APPLIED SYSTEMS; ALWAYS USE WATER-BASED FORMULATIONS (No your temperature tolerances)! Flow these materials heavily at the wall footing junction and or LARGE gaps, creating a build up water-stop detail...

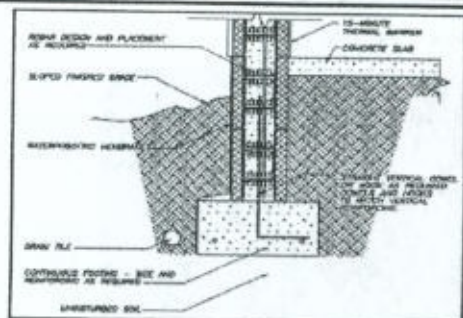


COMBINING – SPRAY APPLIED MEMBRANES with DIMPLED SHEETING TECHNOLOGY IS A REWARDING BULLET-PROOF APPLICATION!



Insulating
Concrete
Form
Association

Typical Foundation Wall Detail



PROJECT WALL WITH SLAB ON GRADE	
SECTION	2114
SECTION NO.	102

"Better buildings by design"

ANY QUESTIONS TO THIS POINT ON YOUR ICF BUILD?

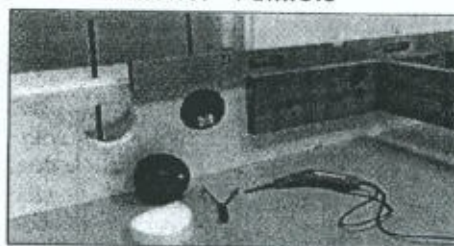
Above Grade Application



Above Grade Preparation Before Pouring the Basement

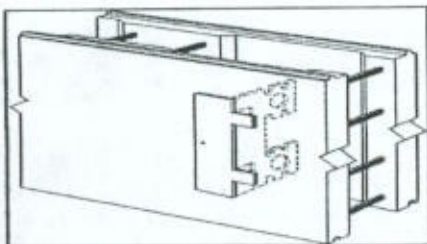
- Locate all door openings on first floor.
- Clearly mark and place a 2"x6" into the wall after pouring. This will act as a nailer for your plywood sub floor.

Anchor Tunnels



Hangers for ledger board and floor systems

SIMPSON
Strong-Tie
CONNECTORS



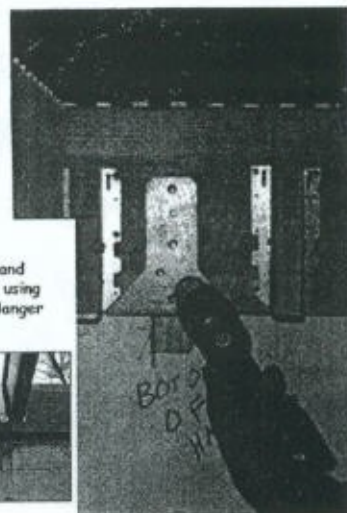
ICF-CONNECT FLOOR JOIST & HANGAR SYSTEM



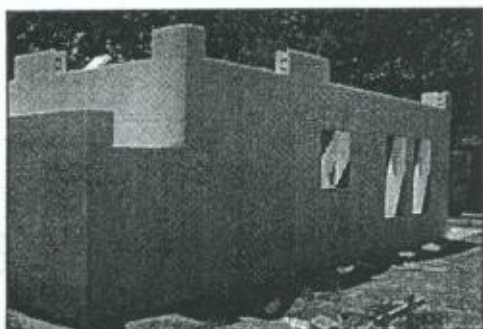
Rotary Hammer Drill every required screw into the plate, through the ledger 2*10 board into the ICF plate portion of this system. Setting up all your floor joist baskets simultaneously & LEVEL~!



Ledger board and joists in place using the Simpson Hanger



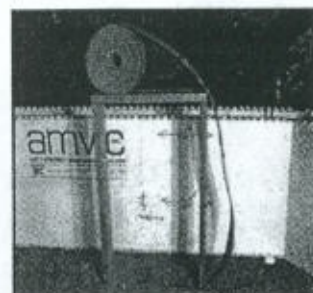
Start layout from the corners to the marked cut form (the same as the basement layout was done), cutting the forms to fit around the door and window openings.



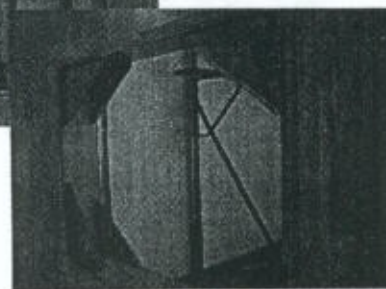
Good, straight cuts are important for a quality installation.

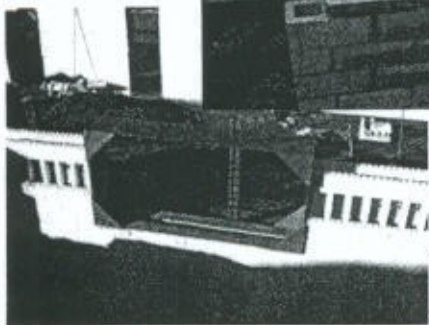
There are basically three ways to build a window or door buck.

- Conventional lumber for surface mounting the window and doors
- Vinyl Buck (V-Buck)
- Conventional lumber to make a frame similar to V-Buck



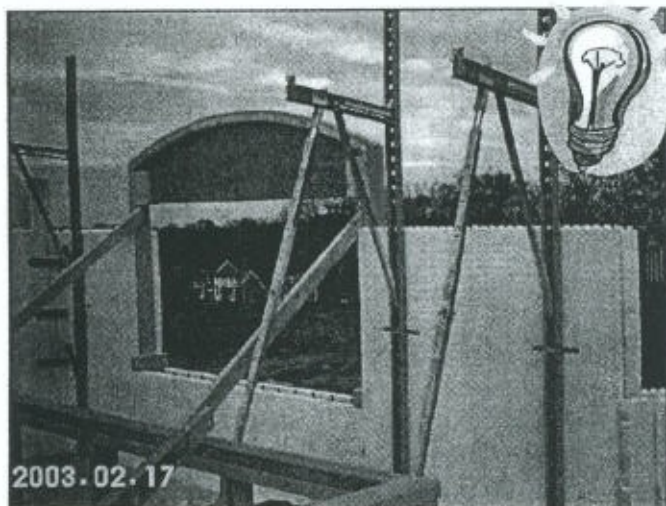
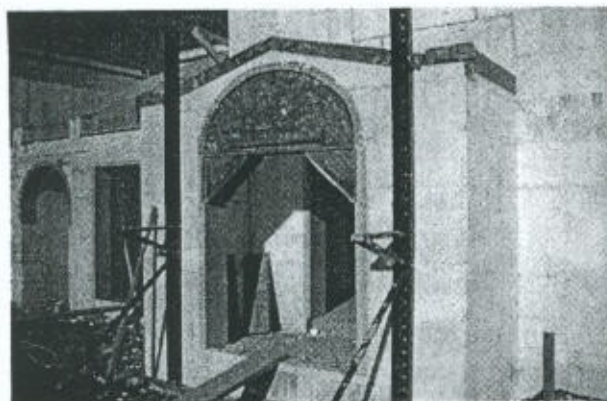
V-BUCK CAN BE PRE-ORDERED FOR SITE DELIVERY
DIMENSION OF OPENINGS INCLUDING RADIUS FORMED
OPENINGS ETC...





When wood framing, it's best to set the frameworks to the outside/plumb to the foam, for your carpenters sake; Corner support each edge, using treated lumber or form-ply board...

Bracing around LARGE openings~!

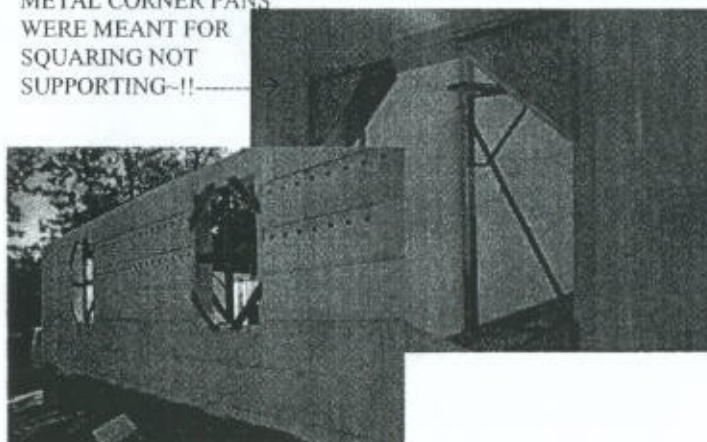


TALL-WALL Scaffolding/Bracing up to 18'-20'

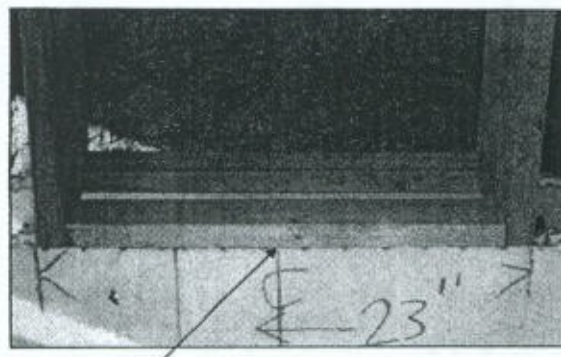


BRACE YOUR V-BUCK SMARTY~!

METAL CORNER PANS WERE MEANT FOR SQUARING NOT SUPPORTING~!!

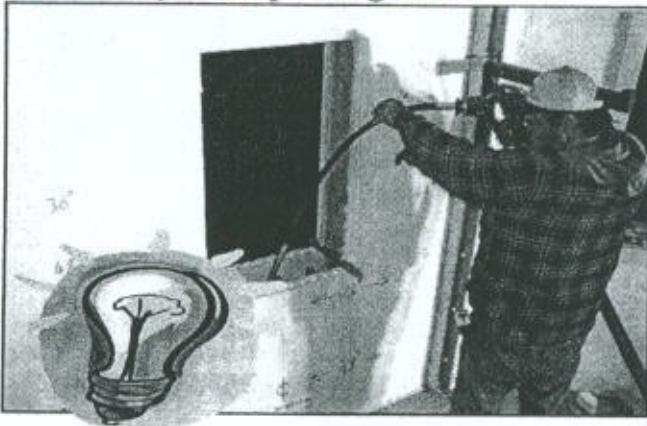


FOUR SIDED LUMBER BUCK W/OPENING

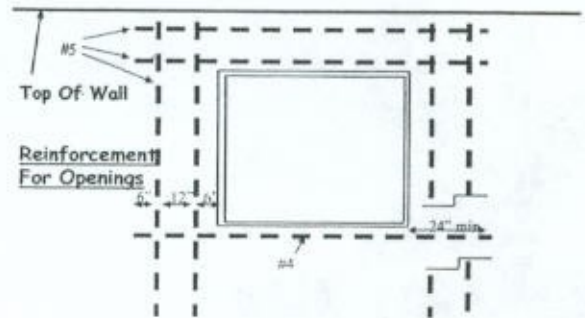


Buck set on wall at center line.

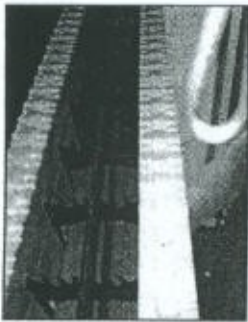
Above Grade Applications pour ALL
your openings first!



Place the horizontal rebar as required. All
window and door openings *must* have 1 horizontal
bar under the window and one vertical 12"
maximum from the side of any opening.



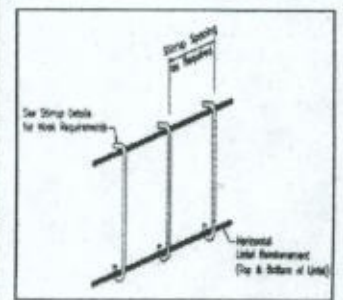
PLACEMENT OF YOUR RE-BAR AROUND OPENINGS...



Place another #5 bar in the top of the form.



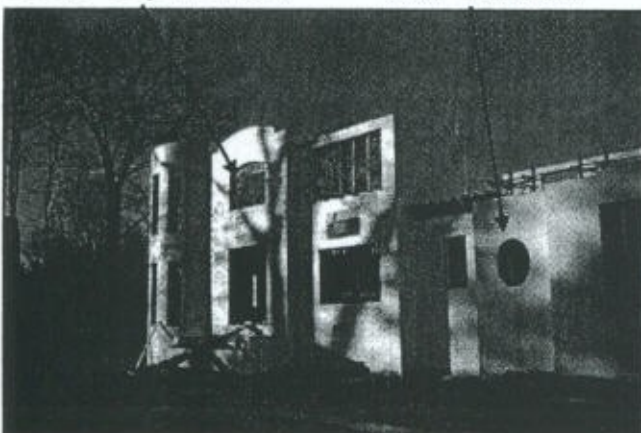
Rebar Placement Stirrups



"Better buildings by design"

Circle Top Window

Oval Window

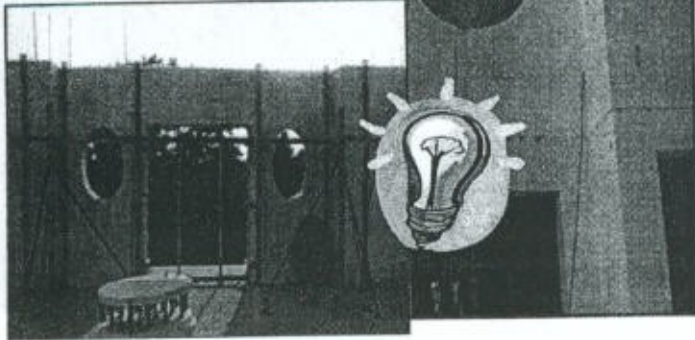


Circle and Oval Window Openings



Locate the opening and make sure that no
horizontal rebar is installed this area.

ONCE YOUR OVAL OR CIRCULAR OPENINGS ARE GAP SEALED; PLACE PLYWOOD TEMPLATE BACK INTO THE OPENING, ACTING AS YOUR BRACING SUPPORT...



Brace the wall just like the basement.



Pay attention to corners that are close to a door or window. The corner must be braced.

Garage Door Detail

Additional 2"x4" must be installed on either side of the door opening to allow for the garage door installation.



Pouring

- Start by filling under all windows and sealing up the cavity.
- Continue to fill the wall in 3' - 4' lifts until done.
- Re-align the wall after the pour
- Strip wall braces the following day. window and door braces that are vertical should remain for 28 days.

TO THE GABLES – K.I.S.S.&SAFE!

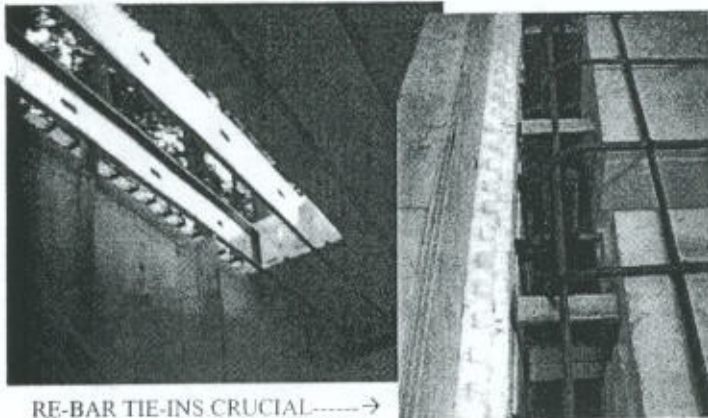


Gables

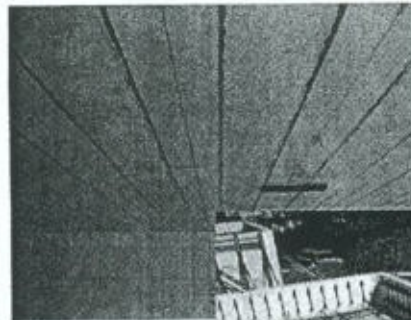


BRACE YOURSELF, SLOW YOUR POUR & IF POSSIBLE LAST CRETE TRUCK ORDER LOWER SLUMP(3/4) & VIBRATE QUICKLY; Go back & trowel smooth the top of each form...

ICFers WALLS & INSULATED CONCRETE FLOORS



RE-BAR TIE-INS CRUCIAL----->

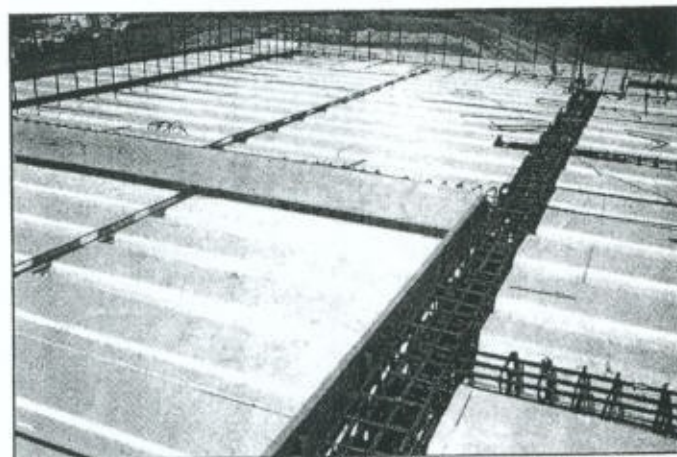


MAKE SURE WHEN CUTTING OUT THE INSIDE FACE OF ANY ICF, FOR YOUR FLOORING SYSTEM; YOU STRUCTURAL SUPPORT BEHIND THAT WEAKENED FORM THOROUGHLY...

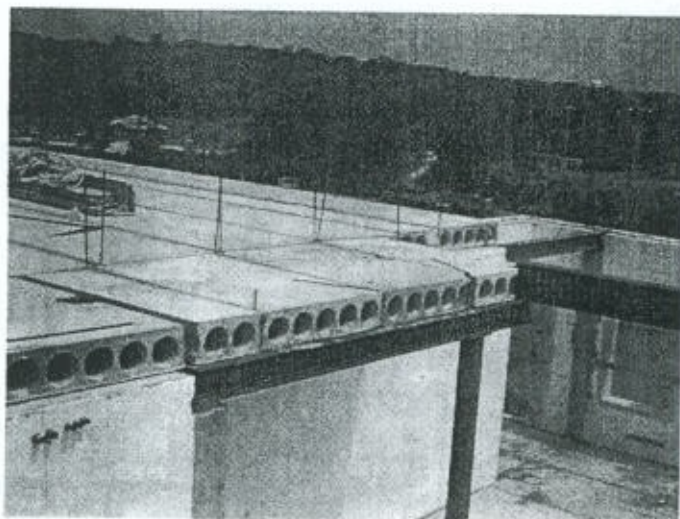
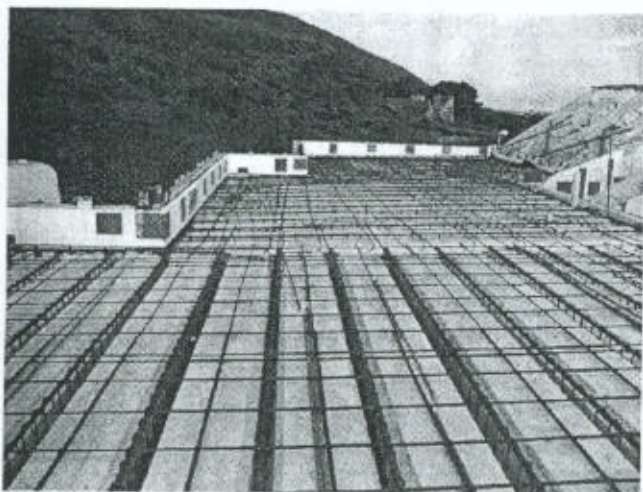
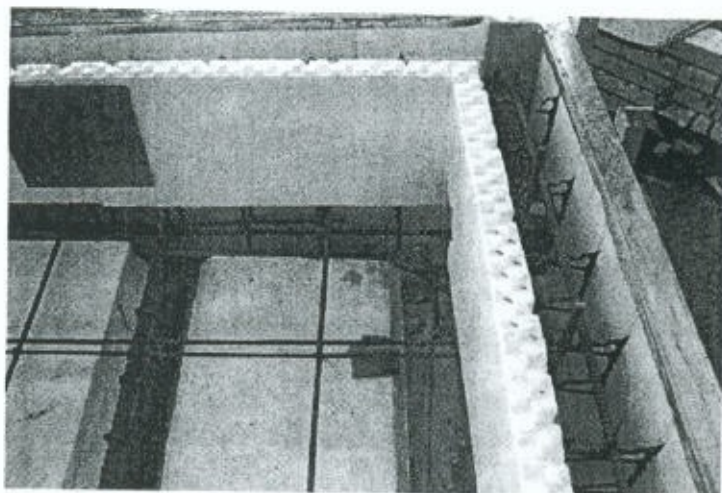
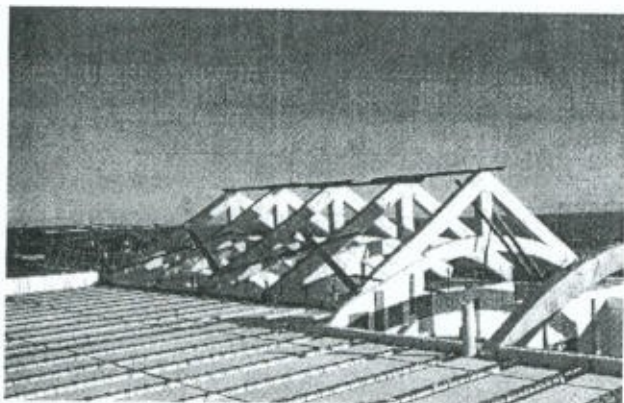
ENGINEERED
REINFORCEMENT
MANDATORY -
DON'T FIGHT IT!



Concrete Floor Systems



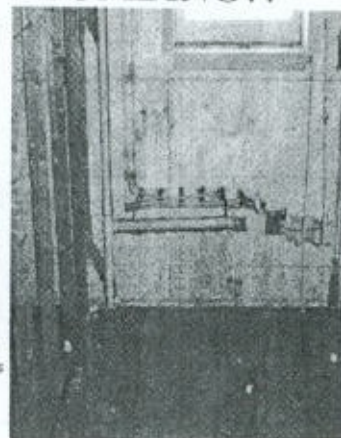
INSULATED DECKING/ROOFING



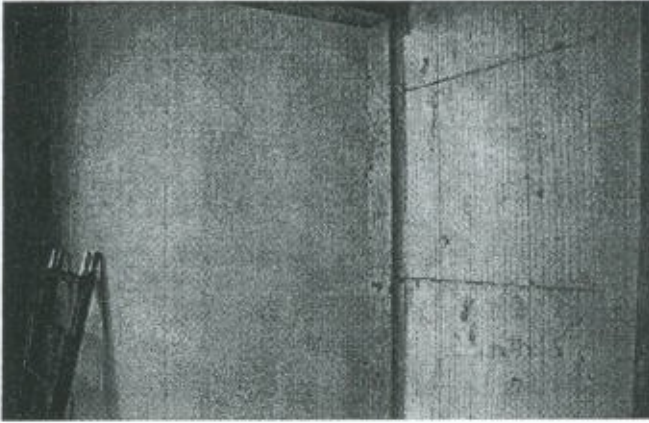
ELECTRICAL?? PLUMBING??



Use hotknife for cutting openings for wires and electrical boxes.



DRYWALL DETAILING...

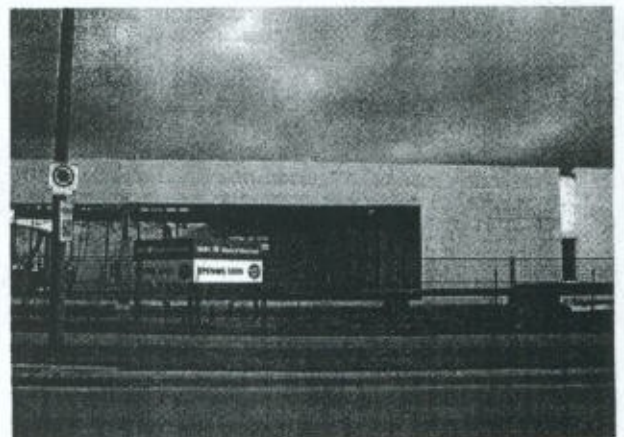


Exterior Finishes

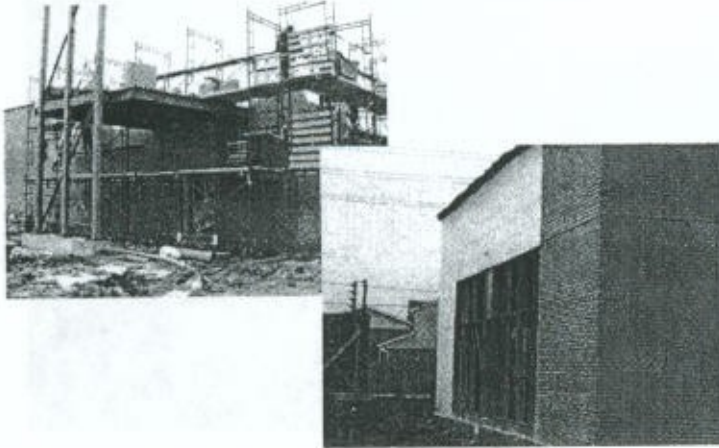
- Wood Siding
- Concrete Siding
- Vinyl Siding
- Synthetic Stucco
- Brick
- Stone



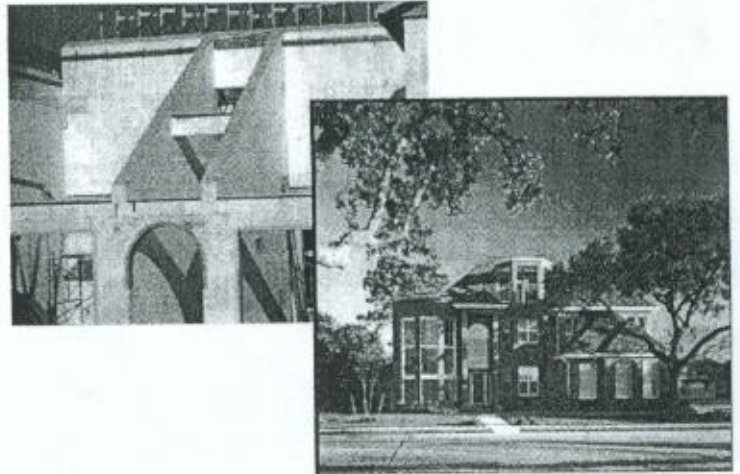
BMO-Milton Energy STAR BANK!



Brick/Stone Detailing...



FEAR NO DESIGN!!!!ICFer's



COMPLETE ICF BUILT SHOW HOME IN VIRGINIA; COMPLETE WITH RADIUS WALLS, OVAL/CIRCLE OPENINGS; STONE, BRICK, STUCCO EXTERIORS - SHE'S A BEAUTY - FEAR NO DESIGN!



PRIVATE SCHOOL -
WOODBIDGE, ON.

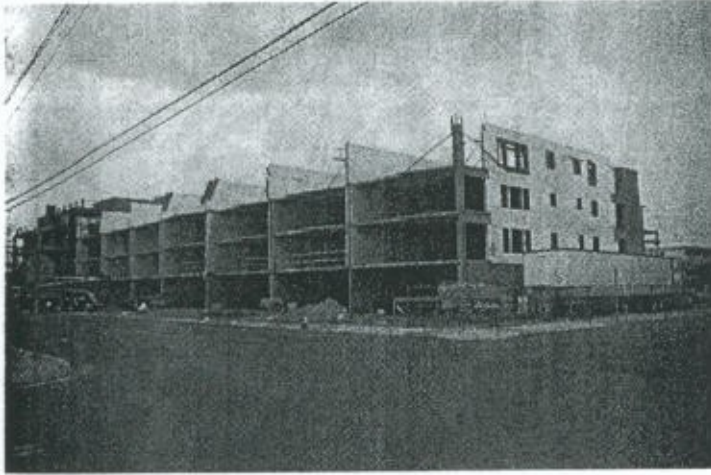
SCHOOLS,
SENIOR
RESIDENCES,
LONG TERM
CARE
FACILITIES,
HOTELS, INNS...



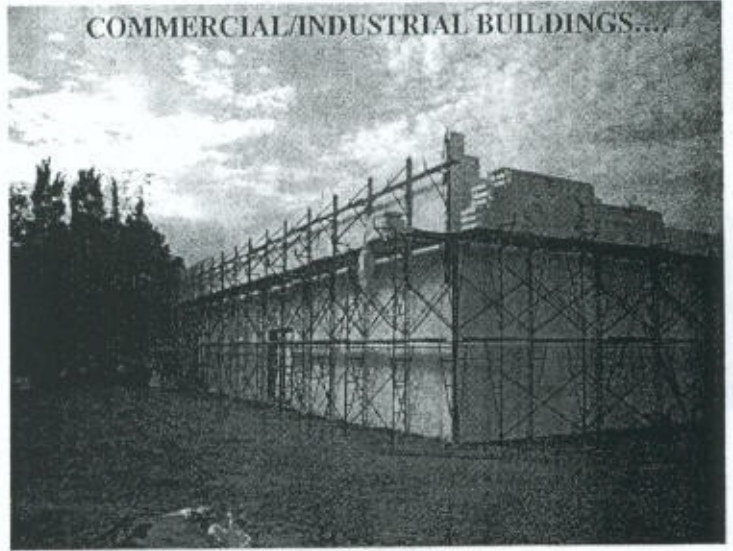
ICF HOTEL/ONTARIO; BUILT ENTIRELY THROUGH A HARSH WINTER...3 YEARS RUNNING, NEAR HIGHWAY & AIRPORT!



CONDOMINIUM PROJECTS...



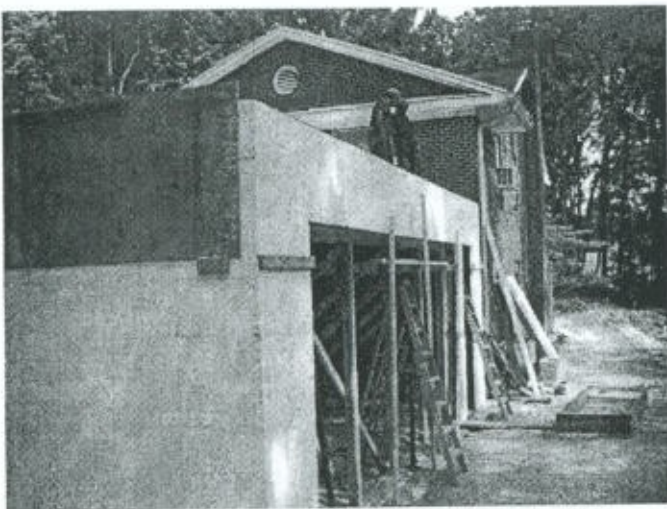
COMMERCIAL/INDUSTRIAL BUILDINGS...



Commercial Plaza's, Banks, Financial Institutions, Gov't & Military Buildings...

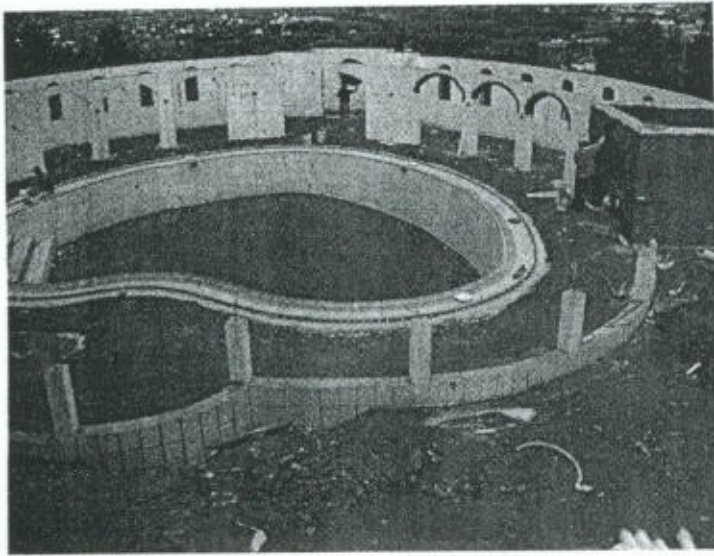


Don't FORGET! Additions matter too. Residential or Commercial-!

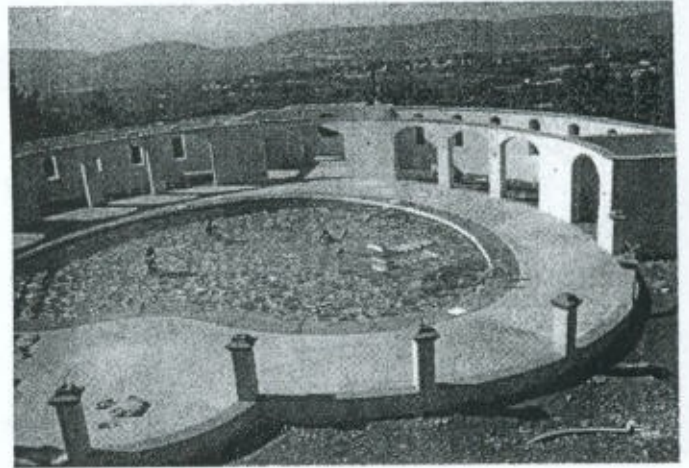


MODULAR & PRE-FAB
HOMES BUILT ENTIRELY
OVER ICF BUILT
FOUNDATIONS;
INCREASE THESE HOME
VALUES SUBSTANTIALY

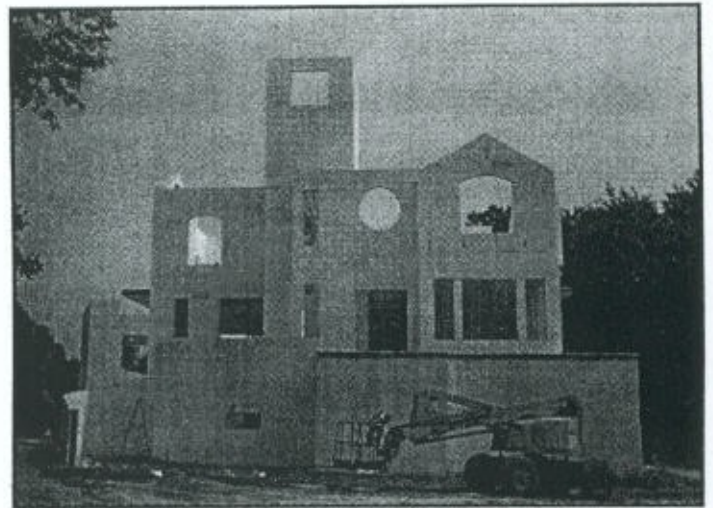
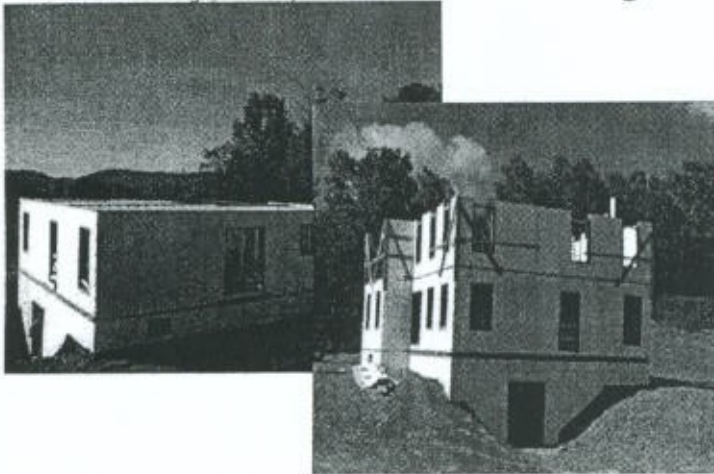




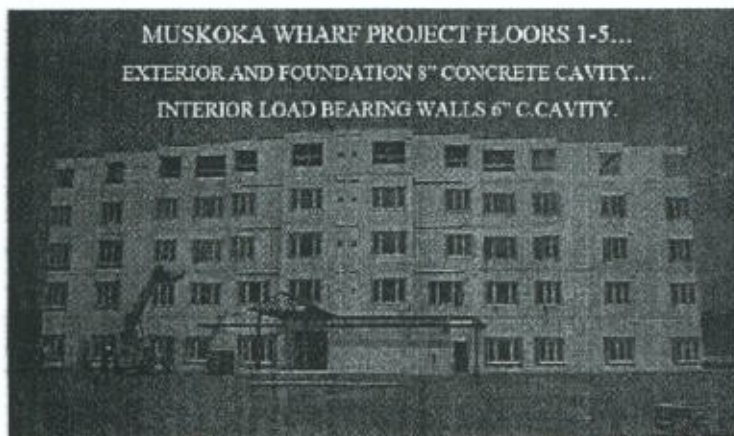
COMPLETED POOL PROJECT...

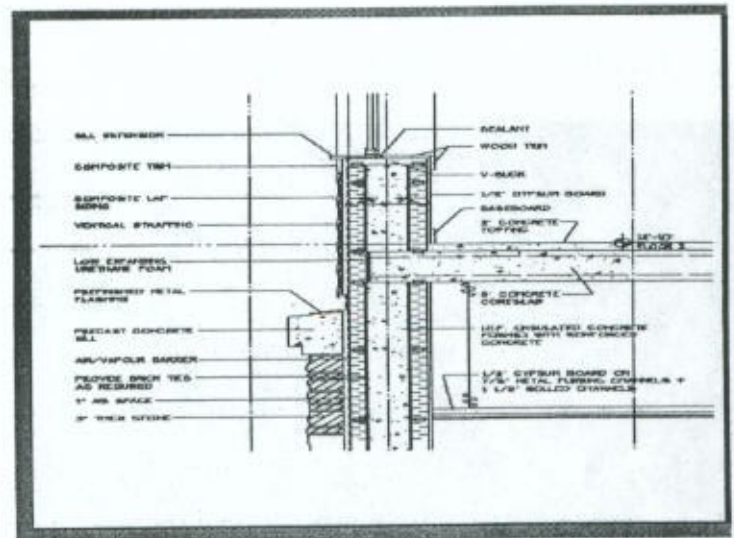
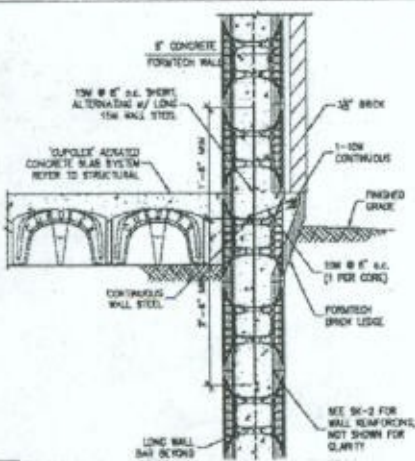
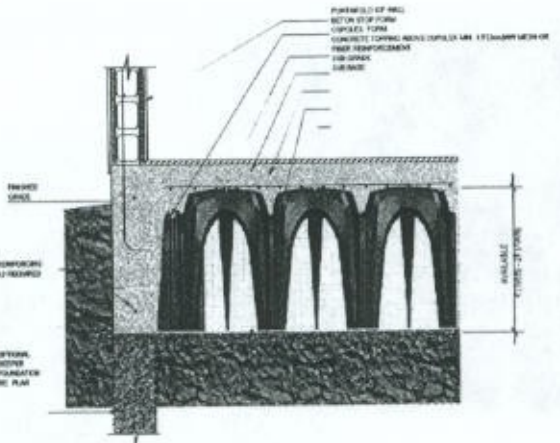
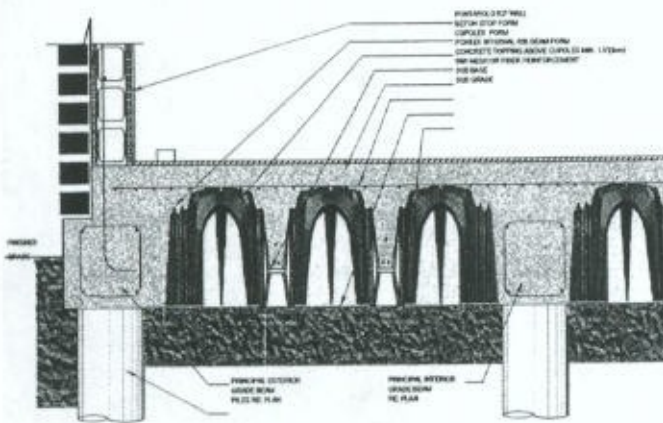
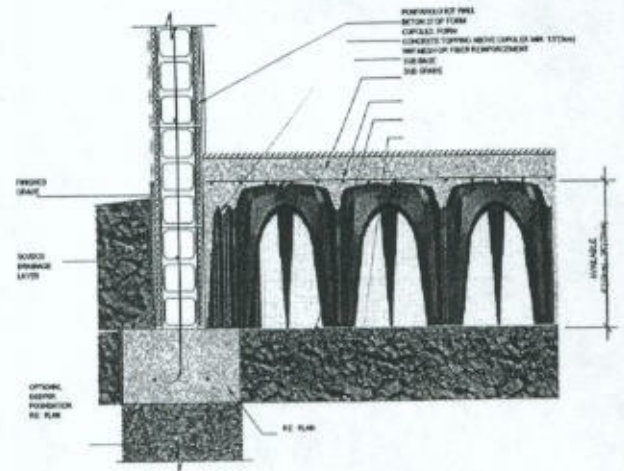


One Storey, two, three-Fear NO Design...



Condo or Assisted Living Projects!





DESIGNED by KMA-Kearns Mancini Architects, Toronto, ON.

WHY ICF's??????

- STRONGER STRUCTURES – CONCRETE BUILT!
- DISASTER PROOF!!!!
- FULLY INTEGRATED BUILD GREEN DESIGNS!
- ENVIRONMENTAL VALUES!
- HEALTHY, CLEAN-AIR, EQUIPMENT LIFE(HVAC/A/C)
- SOUND CONTROL(HUGE->HIGH RISE/COMMERCIAL VALUE!)
- ENERGY, ENERGY, ENERGY, ENERGY;BY THE WAY-> ENERGY!
- INCREASED RE-SALE VALUE, EVEN IN POOR LOCATION(s)!
- REDUCED INSURANCE PREMIUMS IN DISASTER COMMUNITIES!

Thank You!

This concludes the American Institute of Architects
Continuing Education Systems Program.

Any Questions?

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BIG Thanks to:

- FORMTECH/Tegran ICF's...
- Amvic Building Systems...
- Reddi-Form...
- Nudura...
- ARXX...
- Polysteel...
- Certainteed/FormaDrain
- Logix...
- Quad-Lock...
- ECO-Block...
- Reward Wall...



NOTES