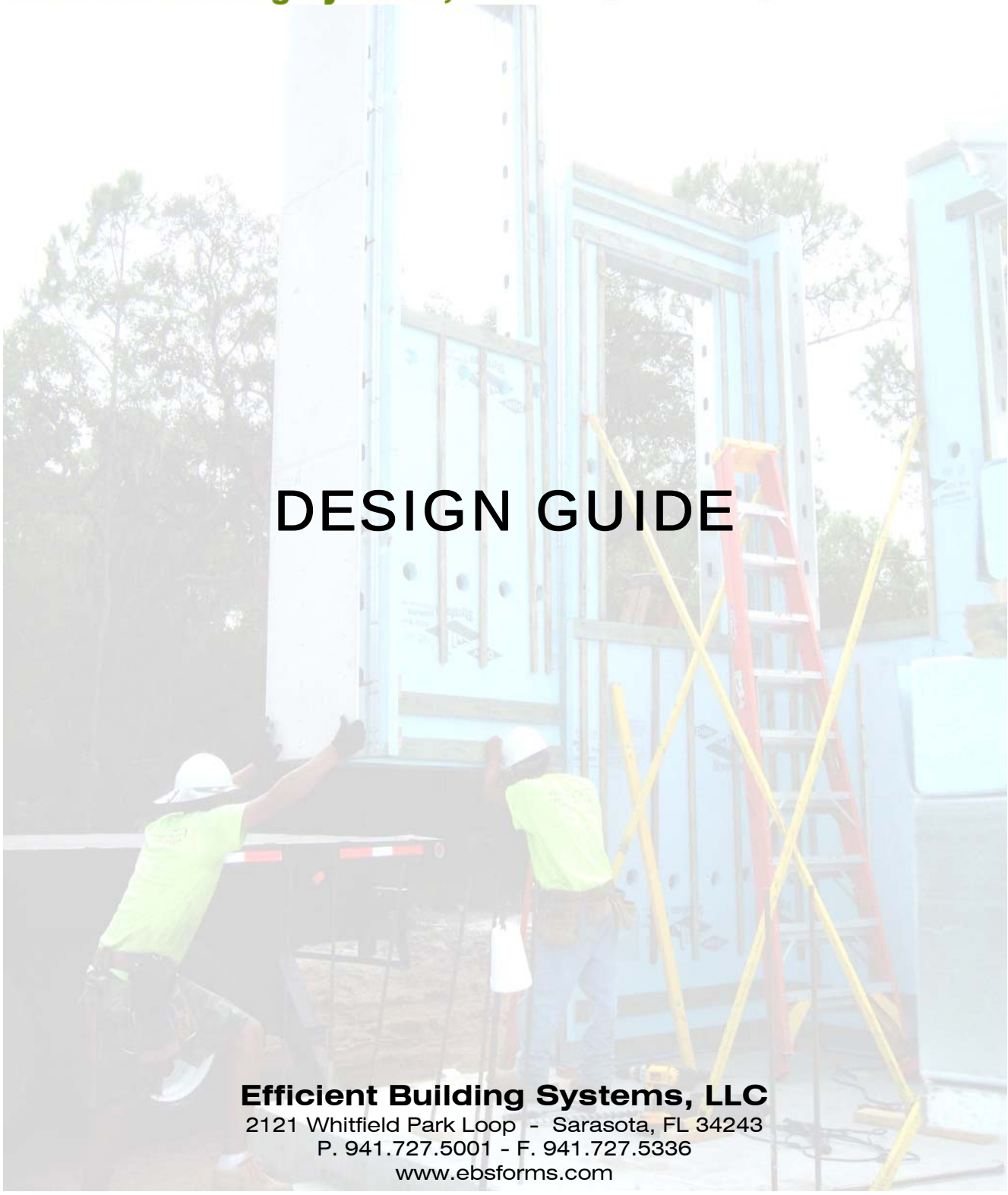
Efficient Building Systems, LLC

STRUCTURAL CONCRETE FORMS™



DESIGN GUIDE

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OUR COMPANY

Efficient Building Systems, LLC (EBS) was founded on three basic principles:

- Simplify the building process.
- Control construction variables (conformance to print, weather delays, labor and material shortages, etc) by manufacturing walls in a tightly controlled off site manufacturing facility.
- Provide a turn-key solution to builders by providing services including the installation of our walls with our own highly trained crews.

EBS Structures are;
Hurricane Resistant, Tornado Resistant, and Anti-Seismic.

How to Contact us:

Toll Free: 866.327.3676
Website www.ebsforms.com

Our product are custom built pre-panelized stay in place forms. The forms are sequentially numbered and delivered to the site in stacks ready for installation directly on a conventional slab. During installation, the wall panels are reinforced with horizontal rebar every two feet. Finally, concrete is pumped into the cavity to create a monolithic steel-reinforced concrete structure; consequently no additional tie beams are required.

Each form is built around either a 4", 6" or 8" structural steel stud frame and then typically clad with 1/2" to 3/4" thick exterior sheathing and 2" thick extruded Polystyrene insulation held by standard 1x2 PT or metal furring strips on the interior. This composite wall imparts a thermal resistance from R-13 to R-23 using single or double insulation respectively (see Thermal Resistance Analysis Chapter for more details). Excellent sound attenuation properties, water penetration resistance, and mold resistance are some of the more important qualities of the EBS Structural Concrete Forms.

The form system is flexible and readily accepts different combinations of cladding materials depending upon the design requirements. Standard variations create walls that are non-insulated, insulated and double insulated - typically used for interior/dividing walls (see figure 1).

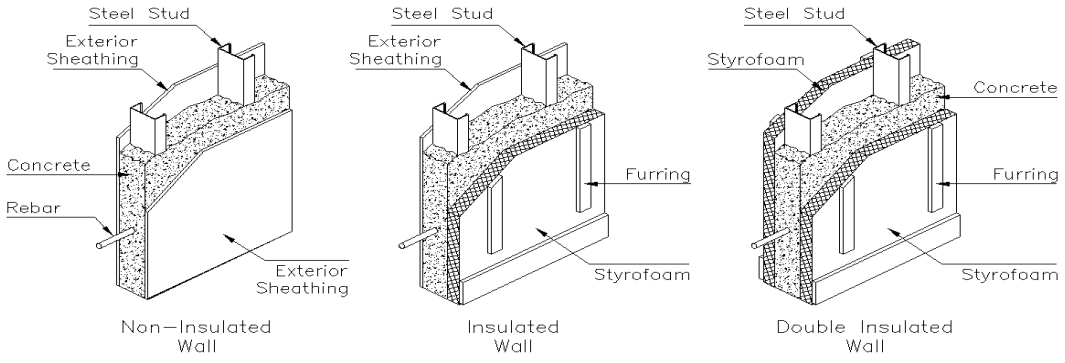


Figure 1

- The forms are custom built up to 10' wide by 18' high. They are ready to receive concrete, stucco, paint and/or drywall.
- All the corners are delivered pre-assembled.
- All openings are pre-built into the forms and precisely located.
- Window sills are solid concrete.

TEST / APPROVALS

This product has been designed and tested to comply with the High Velocity Hurricane Zone of the Florida Building Code.

LZA Technology, Fort Lauderdale, specified the test Protocols to meet Miami-Dade requirements.
Certified Testing Laboratories in Orlando (CTLA) conducted the following tests.

Static Air Pressure Test (DCBCCD TAS 202-94)
Impact Test – Large Missile (DCBCCD TAS 201-94)
Fatigue Loading Test (DCBCCD TAS 203)
Compression Load Test (ASTM E-72)
Shear Resistance (ASTM E-72 / ASTM E 564-00)

Most significant results:
Resisted in excess **250 mph** wind speed.
Resisted **100 mph** debris Impact.

For additional test results contact us.

Based on the tests results the product is approved by:

Miami-Dade:	NOA #03-0114.10
Florida Building Code:	#FL 7854

DISCLAIMER

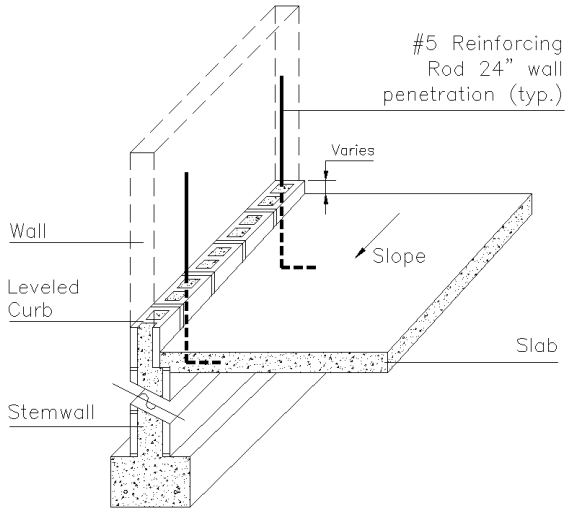
The information in this Guide is only for general information purposes for structures built using EBS Structural Concrete Forms. It is not to be construed as engineering advice on a particular project and does not replace the sound engineering judgment of the engineer of record.

Every attempt has been made to ensure that the information and recommendations contained in this Guide are correct and valid at the time of publication, this document could include technical, typographical, or other inaccuracies or errors. The company reserves the right to make changes, corrections and/or improvements at any time and without notice. In addition, the company assumes no legal liability for the accuracy, completeness, or usefulness of any information, recommendations, drawings, plans and data disclosed herein. The information, recommendations, drawings, plans and data contained in this Guide are provided “as is”, without warranty, either expressed or implied, including, but not limited to, the implied warranties of fitness for a particular purpose.

EBS Structural Concrete Forms can meet any custom-designed floor plan. The following are variables to consider when designing with our system.
The forms can be installed over monolithic or stem wall footings or column-beam type structure for second or more floors. The surface must be level in the areas where the panels will be installed.

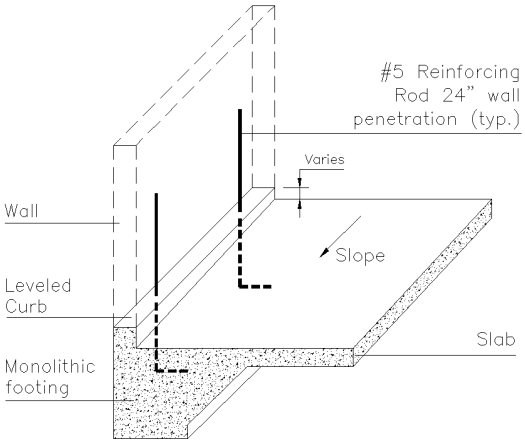
Foundation / Slab

In places where the floor must be sloped, like garages, we suggest continuing the stem wall at the same level as the house (as shown on figure 2) or building a curb if the footing is monolithic (see figure 3).



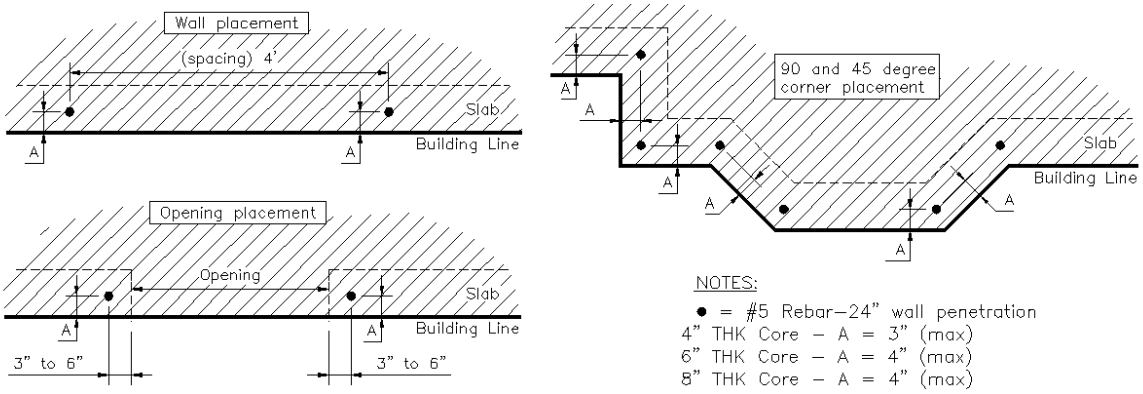
Curb on Stem-Wall
Figure 2

In cases where the slab is designed with a recess all around, that recess must be wide enough to receive the panels.



Curb on Monolithic Footing
Figure 3

The location, size, and spacing of the vertical dowels must either meet the requirements shown on figure 4 , or be specified by the engineer of record for the job.



Vertical Dowel placement (typ.)

Figure 4

ARCHITECTURAL GUIDELINES

Walls

Select the wall type based on the design requirements (non-insulated, insulated or double insulated) and the finish to be applied (paint, stucco, drywall, siding, etc.).

Once the preliminary design is complete, refer to the “Engineering Parameters” section on the Technical Guide to size the walls and lintels to withstand the appropriate applied loads. Thinner walls offer lower costs and increased living space.

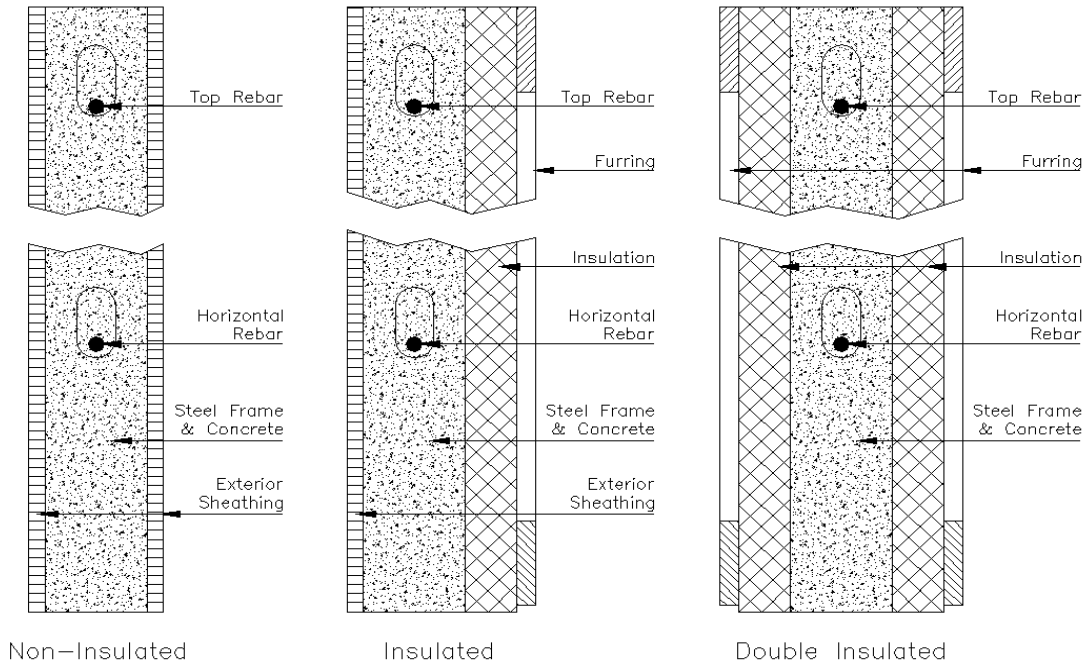


Figure 5

Depending upon the wall configuration selected, the overall wall thickness will vary from 5” to 13 1/2”. See in figure 5 the typical wall assembly profiles.

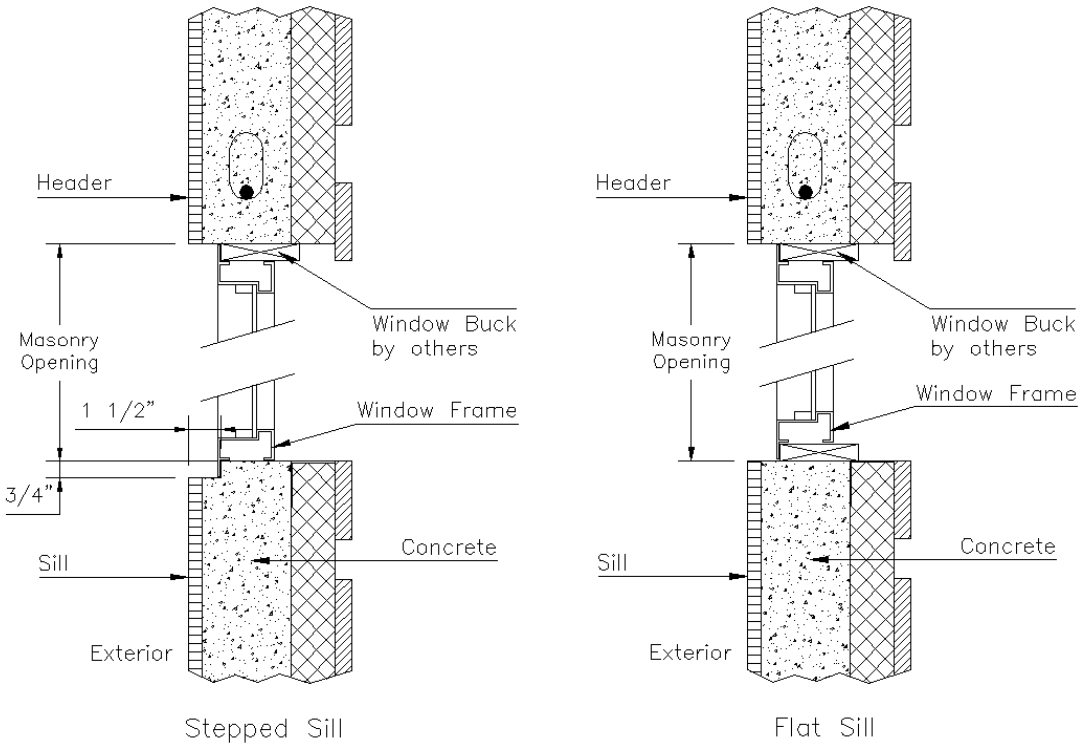
Verify that lintels match the configuration of the connecting walls

Openings

As openings for windows and doors are pre-built into the forms and precisely located, accurate dimensions must be specified in the final set of prints.

The openings provide by EBS Structural Concrete Forms are masonry openings (M.O.) with no buck. Typical bucking material used to wrap the openings is standard 1x or 2x pressure treated lumber, fastened according with local regulations (provision and installation by others).

Window sills are solid concrete poured simultaneously with the walls. Typical variations include a standard ¾" stepped sill to receive a flanged window frame and a flat sill for fix glass windows, glass blocks, fin windows, window frame without buck (as commercial type), etc. See figure 6.



Window Opening Detail
Figure 6

Floors / Roofs

Different types of floor and roof systems can be used on single and multi-story buildings. The thickness of the wall must be considered when selecting attachments.

See Section "Other Trades / Connections" for different options.

FIRE-RESISTANCE RATING

EBS Structural Concrete Forms consist of a 4", 6" or 8" (typ.) thick cast-in-place concrete, reinforced with vertical steel studs, horizontal rebar, and with different combinations of cladding.

The Fire-resistance Assembly Rating with finishes of gypsum wallboard on one or both sides calculated in accordance with the FBC Section 721.2.1.4 and tables 721.2.1.1, 721.2.1.4(1), 721.2.1.4(2), is established on the fire-resistance rating table shown below.

Other assemblies not included on this section can be calculated in compliance with the FBC.

Fire-Resistance Rating Table

Concrete		Wall Finish [1]	Fire Resistance Rating (hour)
Thickness (in)	Type [2]		
4	A, B, C, D	Require ½" Regular Gypsum Wallboard	2
6	A, B, C, D	Require ½" Regular Gypsum Wallboard	4

[1] The layer of gypsum wallboard must be attached to the interior side of the exterior wall, and to both sides of the interior wall. The wallboard shall be fastened with 1 ¼" long drywall screws @ 8" o.c. Joints must be treated and compound.
[2] Concrete Type: A = Siliceous, B = Carbonate, C = Sand-Lightweight, D = Lightweight. Concrete must have a minimum 3,000 psi compressive strength @ 28 days.

WALL PENETRATION

Where a fire-resistance rated wall needs to be penetrated by other items such as steel, copper pipes or steel conduits, the annular space between the penetrating items and the concrete shall be protected by a FBC approved penetration fire stop caulk. This product must be tested in accordance with ASTM E 814 or UL 1479 and installed as per manufacturer specifications.

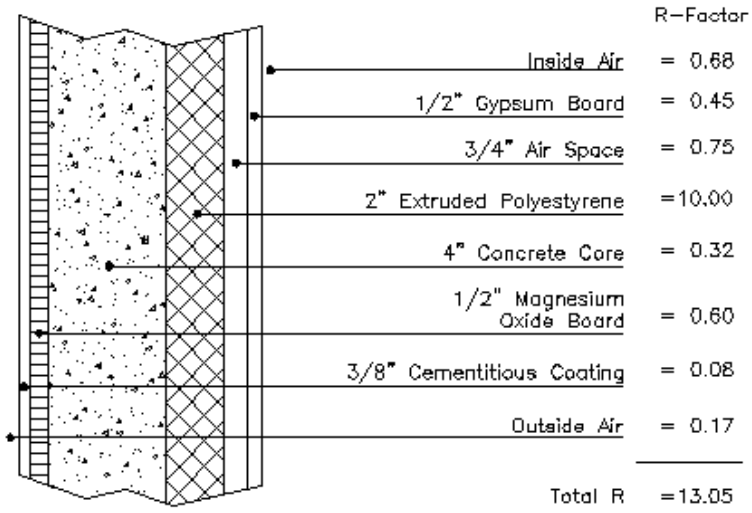
Where the penetrating item is a maximum of 6" nominal diameter and the opening is a maximum of 144 square inches, concrete, grout or mortar can be used to fill the gap thick enough to maintain the fire-resistance rating of the wall.

All the penetrations through a fire-resistance rated wall shall comply with the FBC Section 712.

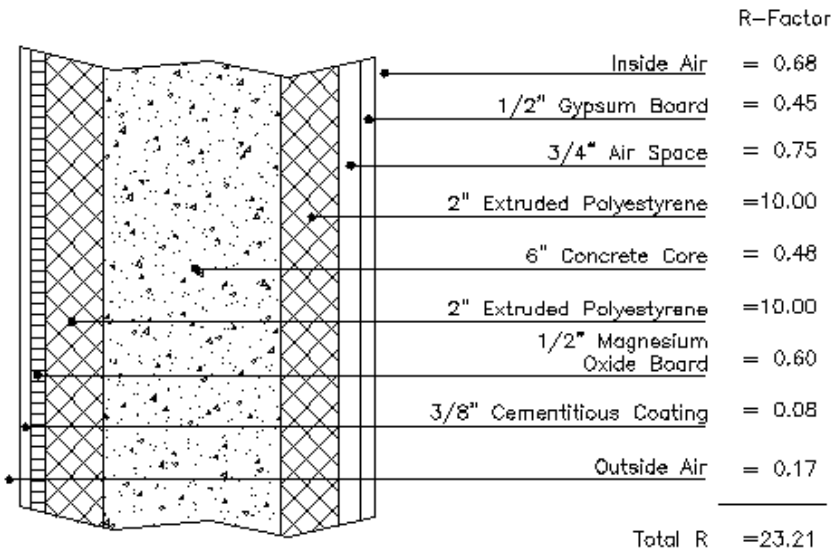
THERMAL RESISTANCE ANALYSIS

Since the EBS Structural Concrete Forms accepts different combinations of cladding and core thicknesses, the thermal resistance varies depending of the material used.

We are showing on this chapter two typical cases, using single and double insulation with 4” thick and 6” thick core respectively. Both cases are exterior walls.



U–Factor = 1/13.05 = 0.077 Btu Ft² °F



U–Factor = 1/23.21 = 0.043 Btu Ft² °F

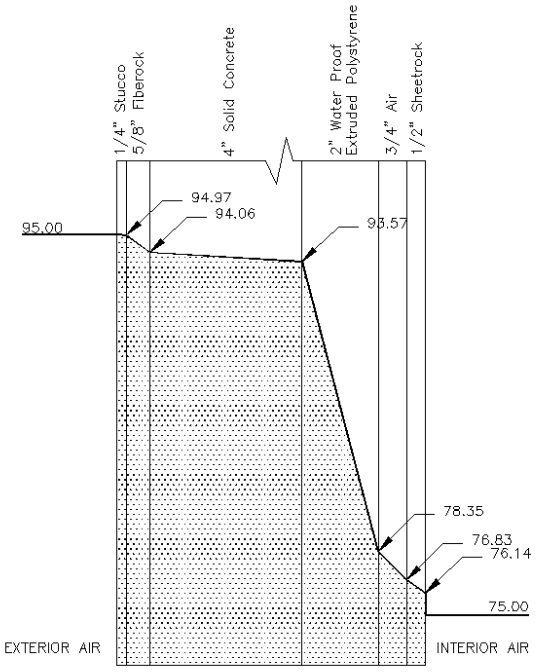
This calculations are based on information obtained from the textbook “Principles of Heating, Ventilation and Air-Conditioning” published by the American Society of Heating, Ventilation and Air-Conditioning Engineers, Inc.

MOLD RESISTANCE

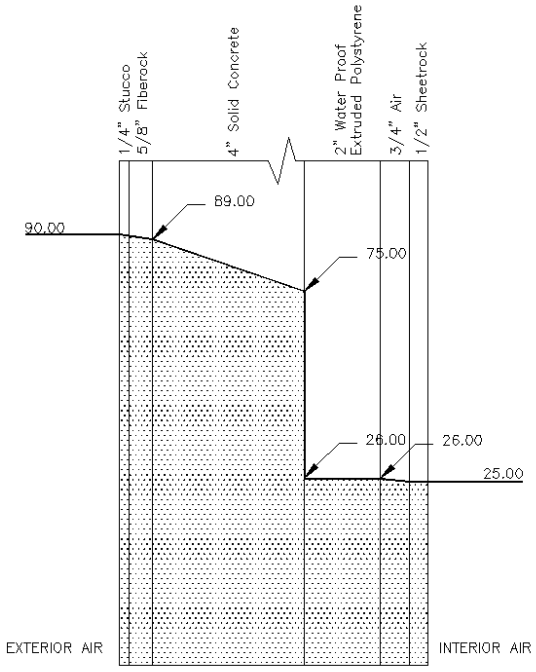
TEMPERATURE AND HUMIDITY INTERACTION, DEW POINT

The condition for mold formation is warm humid air in proximity to dead organic materials such as wood.
Temperature distribution through our wall was calculated to find any potential mold area. The results are shown below.
The computations were made based on Fourier's law for heat transmission through solids. Humidity transmission was estimated based on the relative porosity of the materials and published data.

The assumed condition were:
Exterior (ambient) temperature 95º F @ 90% humidity.
Interior (room) temperature 75º F @ 25% humidity.



TEMPERATURE (DEG. FARENHEIT)



HUMIDITY (%)

These graphs indicates that the area that show the combination of temperature and humidity most appropriate for mold growth is the interface of the concrete with the polystyrene. However, since the concrete was poured this area does not have any air.
The cavity behind the sheetrock, where air and wood (furring) are present exhibits low temperature and low relative humidity.

Dew point analysis are shown on “Appendix A” for different configurations of walls. Those calculations show clearly that there is no condensation in the wall on any case.

The conclusion of this study is that mold can NOT develop in walls built with our forms.

FOOTING

The EBS Structural Concrete Forms can be installed on a conventional slab with either monolithic or stem wall foundations.

The design, sizing and reinforcement of the foundation must be calculated by the site specific Engineer of Record.

To connect the foundation to the wall when required to resist uplift and shear, vertical dowels must be embedded into the footing. Spacing and wall penetration of the dowels shall be specified in accordance to the loads applied (#5 rebar, 24" wall penetration and 4' o.c. spacing typ.). See also figure 4 in section "Architectural Guidelines" for specific location of the dowels to meet the different thicknesses of EBS Structural Concrete Forms.

FLOOR & ROOF SYSTEMS

EBS Structural Concrete Forms is a custom made system that accepts all types of mix-construction connections. There are different ways to connect floors and roofs systems to our walls.

Tie Down Connectors

Most connectors between concrete and wood or steel are compatible with the System.

Embedded truss strap connectors like "Simpson Strong-Tie" Meta or Heta type as shown on figure 8 are common on hurricane resistant constructions.

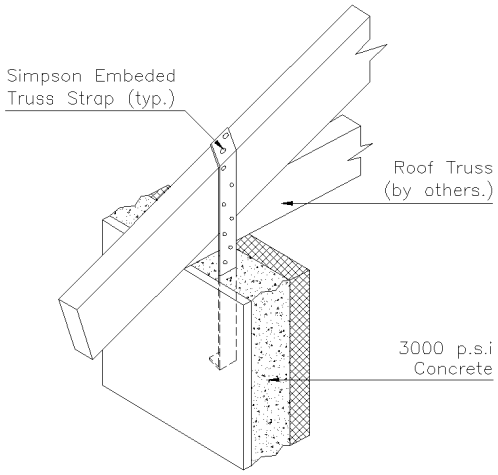


Figure 8

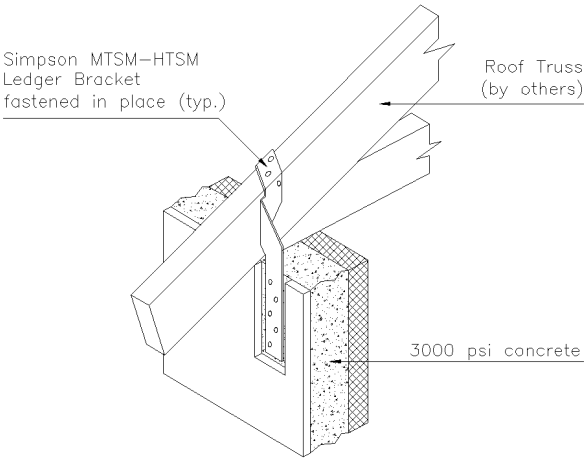


Figure 9

Connectors fastened to the concrete are also common and attached to the wall like "Simpson Strong-Tie" MTSM or HTSM type (twist straps) when embedded straps are not practical. See figure 9

Ledger Hangers

Where the wood trusses or light weight steel joists require ledger boards, the connection could be done using “J” bolts embedded in the concrete wall, as standard concrete construction.

There is an alternative option which is using the ICFVL, ICFVL-W, & ICFVL-CW “Simpson Strong-Tie” Ledger connectors. It is a special design and mounted through the Polystyrene to the concrete. They come in two parts, one is embedded into the concrete and the second attaches the ledger to the first part. See figure 10.

All connectors (“Simpson Strong-Tie” or similar) must be installed per manufacturer specifications.

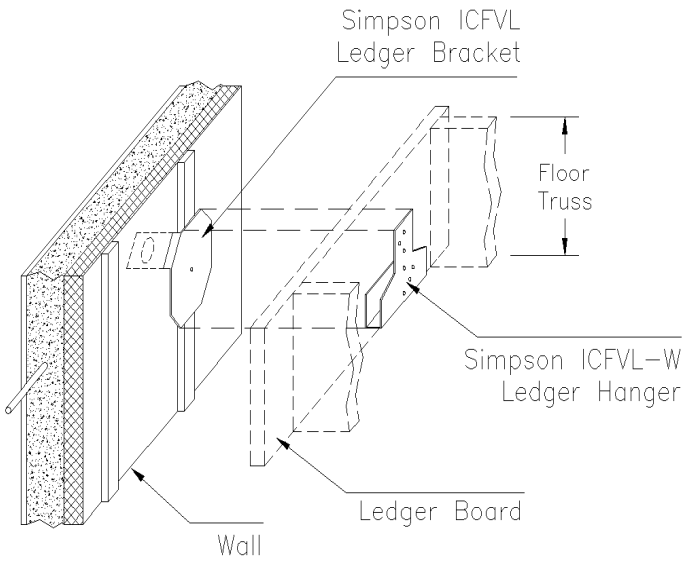


Figure 10

Concrete floors/roofs

Conventional Cast-in-Place floors and roofs integrate well with EBS Structural Concrete Forms.

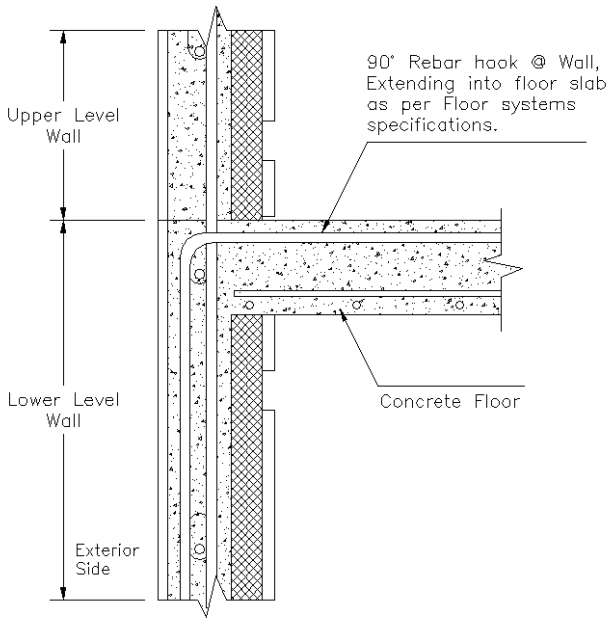


Figure 11

The forms come prepared with slots (pre-made in factory) to assure continuity of concrete between the wall and the slab with the required steel reinforcement for the connection specified by the Engineer of record (figure 11)

This detail is also extensive to other concrete systems as the lightweight concrete forms, steel Deck, Hollowcore Planks, etc. Please find in General Details each particular case.

Steel rod joist & metal deck assemblies

The composite system made of Steel Joist, metal deck poured with concrete on top, is another option for floors and roofs, especially on commercial buildings.

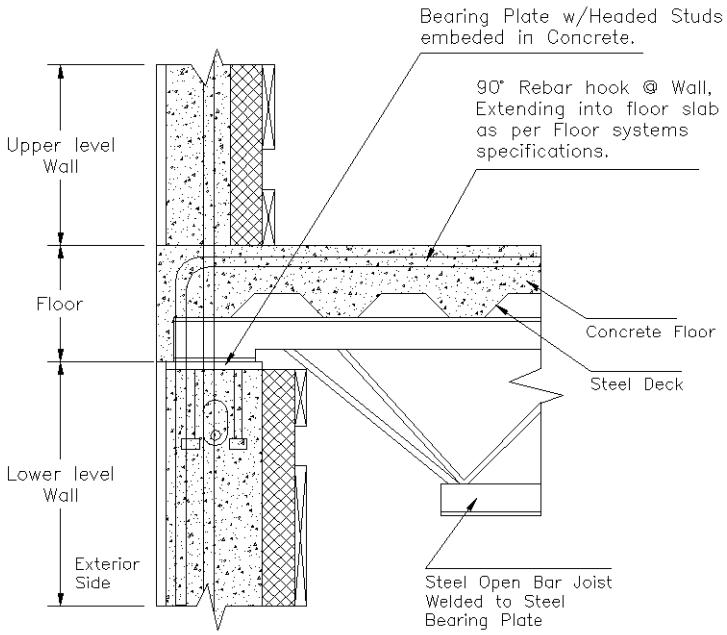


Figure 12

As soon as the concrete acquires enough strength so the deck can support walking over it the next floor could be installed saving a considerable amount of material and time.

For this purpose the walls, as cast-in-place concrete forms, are ready to receive the joists and deck. If necessary, the deck and the upper portion of the wall could be poured at the same time, this assures concrete continuity.

See General Details for Additional connections.

ELECTRICAL

EBS Structural Concrete Forms are specially designed to equal the standard construction.

- Electrical cables are placed in the space between the polystyrene insulation and the sheetrock.
- Full size interior electrical boxes are installed by cutting the polystyrene insulation with a hot knife, a rotor zip or just an utility knife. This process is much quicker for the electrical trade than chipping concrete (figure 13).
- Outside connections require a conduit which is installed before the form is filled with concrete.

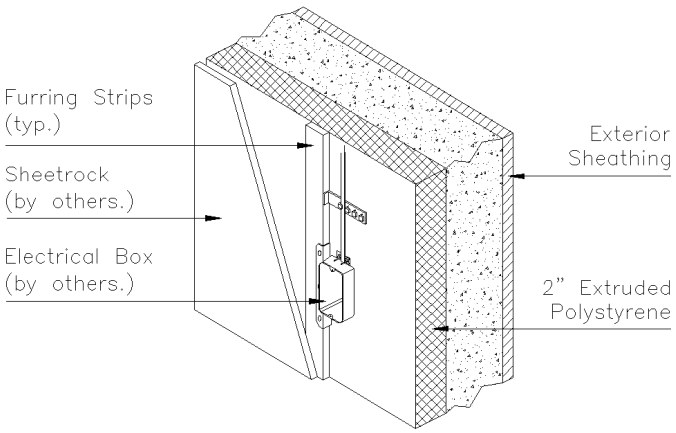


Figure 13

PLUMBING

Plumbing can be embedded into the concrete by running pipes though the slab or floor and up the forms before pouring concrete.

It can also be run through the 2" thick polystyrene insulation or along the lower furring strip when size allows it.

Outside plumbing is installed before the EBS Structural Concrete Forms are filled with concrete.

VENEERS & FINISHES

Gypsum Wallboard

The interior side of the insulated forms are furred with pressure treated lumber, or metal strips, and are ready to receive Gypsum Wallboard (provision and installation by others). This wallboard shall be installed in accordance with local regulations and manufacturer specifications.

Cementitious Coating

For Cementicious finishes use a scratch coat, followed by a texture finish on the exterior side.

The following materials must be used:

- Fiberglass Joint Tape for all joints / seams.
- Link Lanco – Professional Grade Concrete Bonder- CB-900 / CB-901 (non-diluted product) according to manufacturer's specifications.
- Fiber Mesh- Harbourite Micro-reinforcement-available through Rinker Material. Recommended length ¾"-1".
- Rinker Stucco Cement, Tarmac Stucco, or Cemex Broco.

Exterior Veneers

On the projects designed with exterior siding planks, EBS Structural Concrete Forms has a standard configuration, per request, that includes furring on the exterior of the form.

Other veneers such as exterior brick or stone can be easily installed on our walls using conventional anchors attached to the steel stud or directly to the concrete after the forms are poured.

Detail 1	4” Core - Non-Insulated Wall
Detail 2	4” Core - Insulated Wall
Detail 3	4” Core - Double Insulated Wall
Detail 4	6” Core - Non-Insulated Wall
Detail 5	6” Core - Insulated Wall
Detail 6	6” Core Double - Insulated Wall
Detail 7	8” Core - Non-Insulated Wall
Detail 8	8” Core - Insulated Wall
Detail 9	8” Core Double - Insulated Wall
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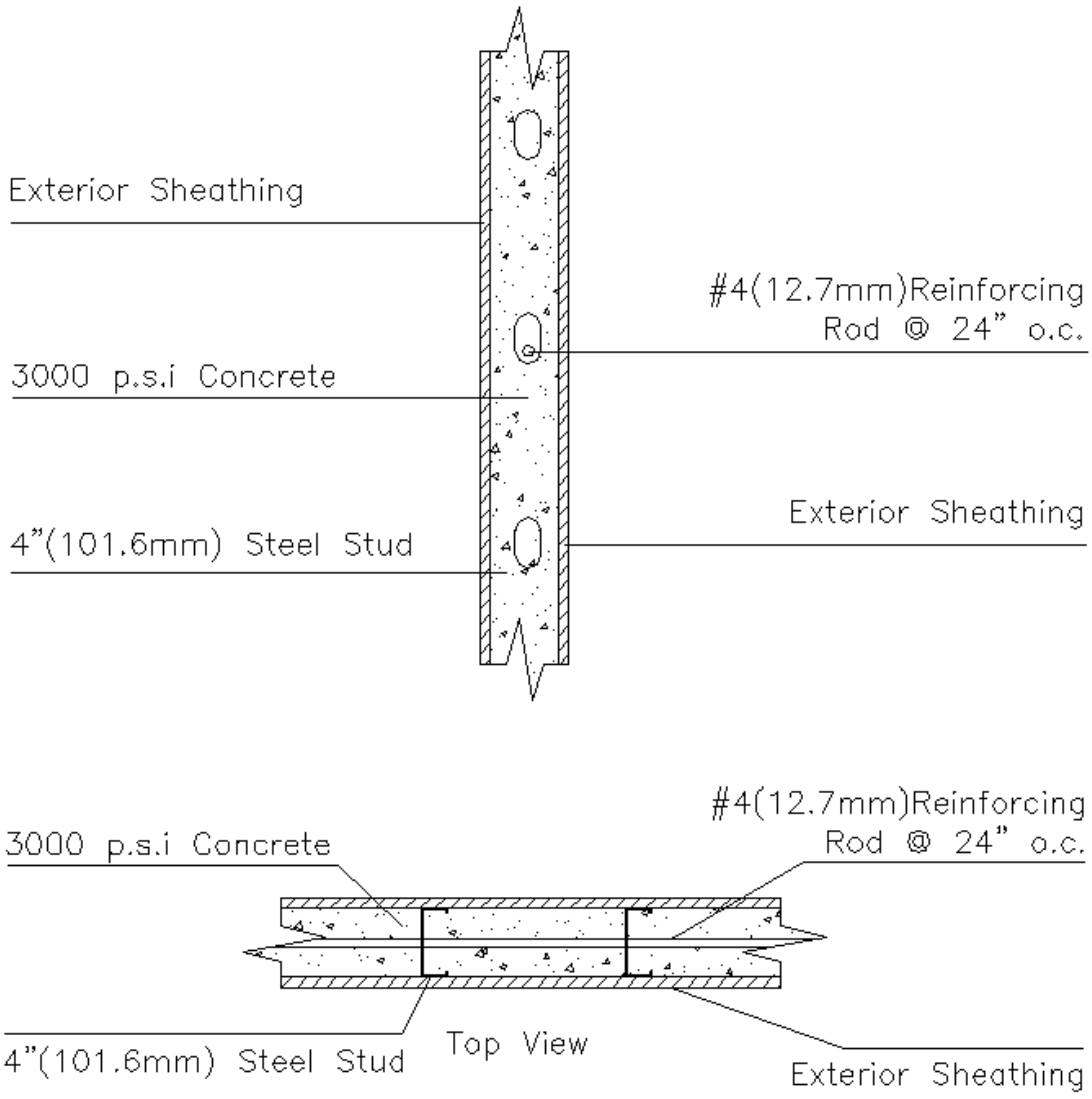
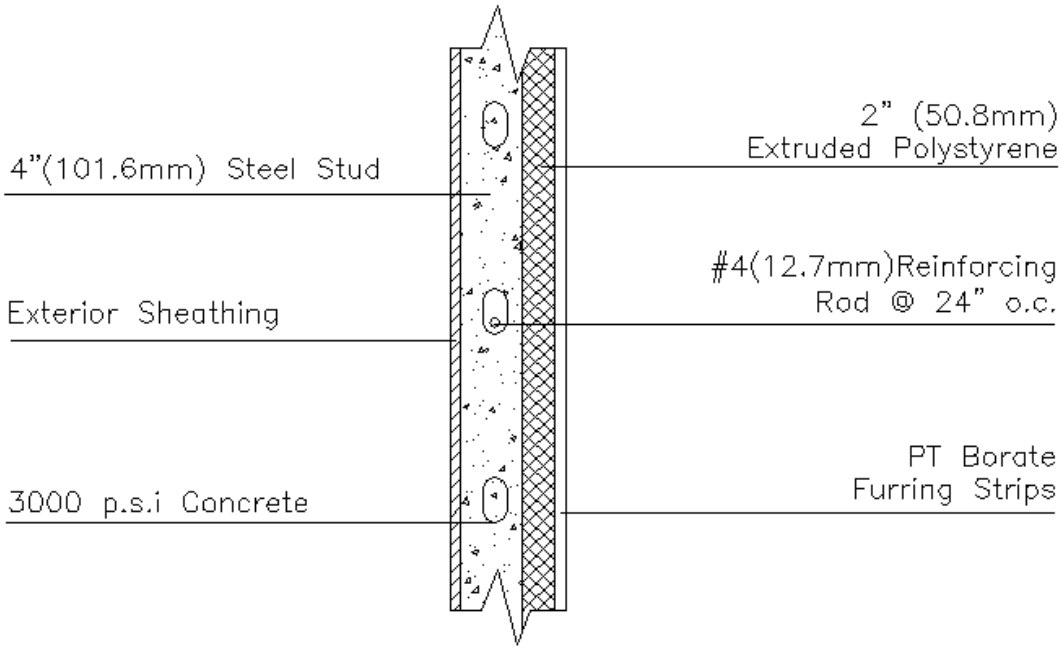
Detail 37	Steel Bar Joist/Deck Composite Floor System to Wall Connection Detail
Detail 38	Steel Joist Girder to Wall Connection Detail (typ.)
Detail 39	Steel Joist to Wall Connection Detail (typ.)

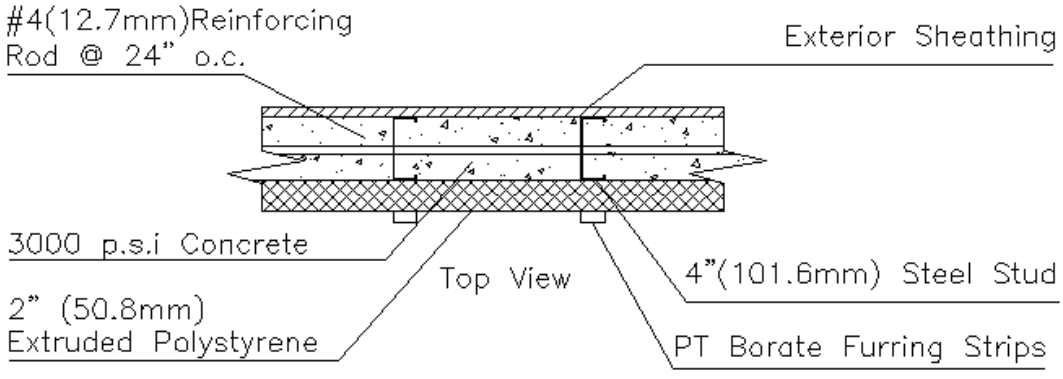
DETAIL 1



4" Thick Core
Non-Insulated Wall

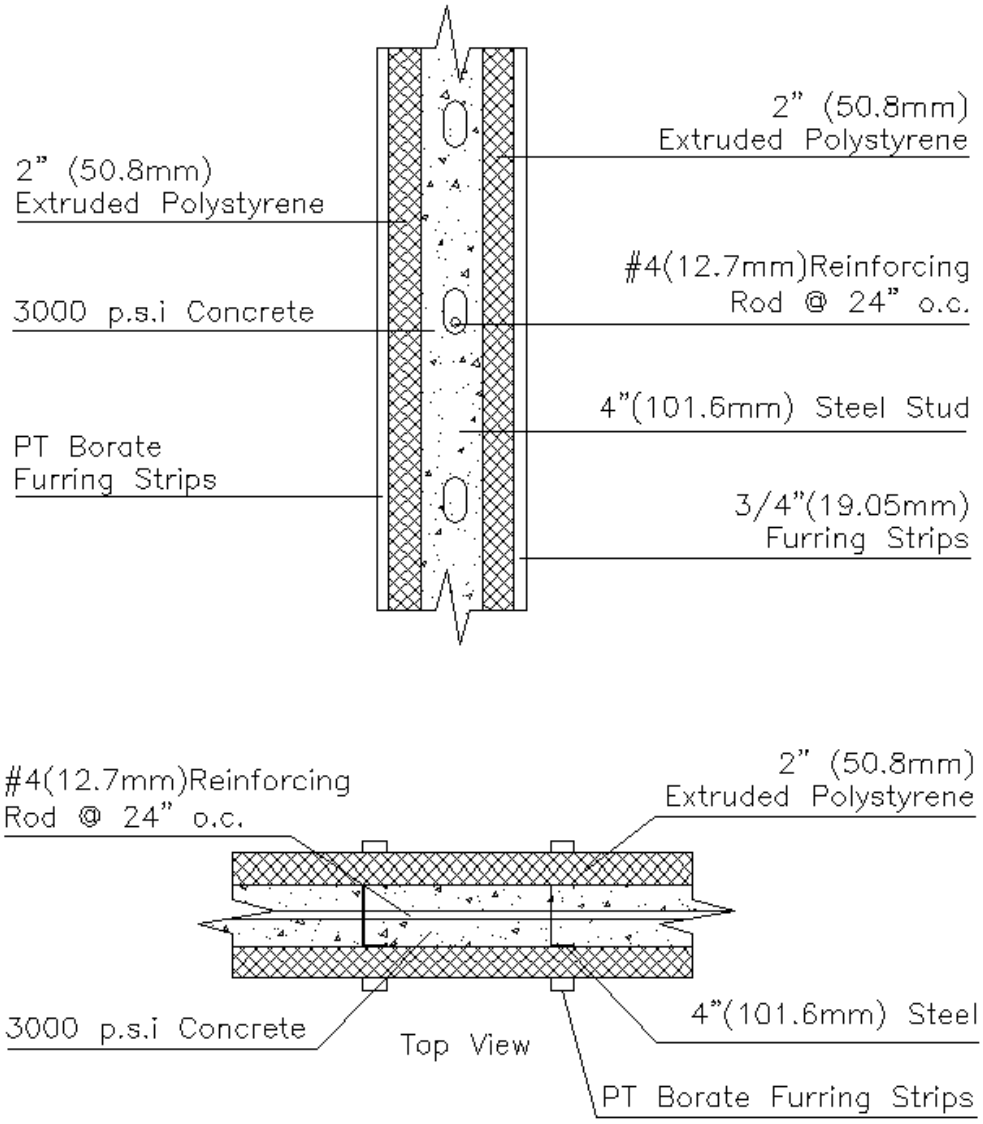
DETAIL 2





4" Thick Core
Insulated Wall

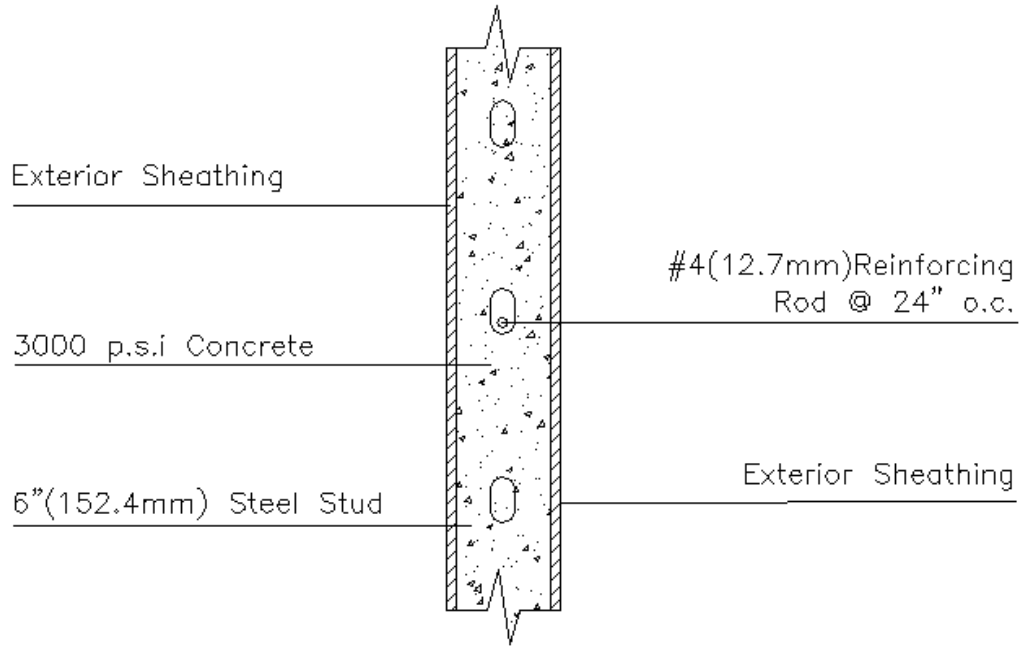
DETAIL 3

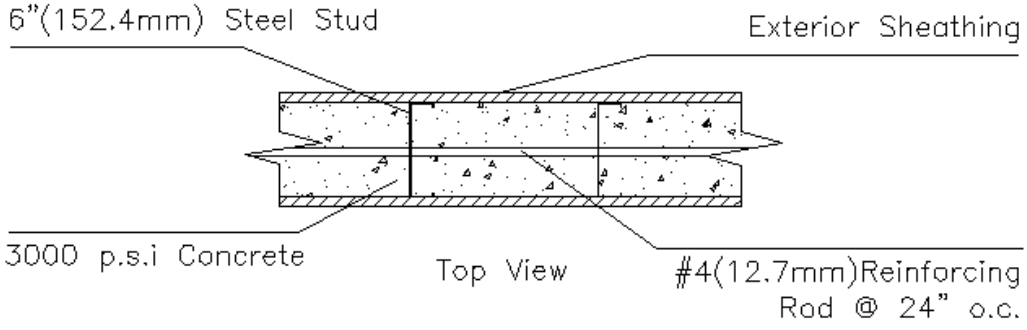


4" Thick Core
Double Insulated Wall

GENERAL DETAILS

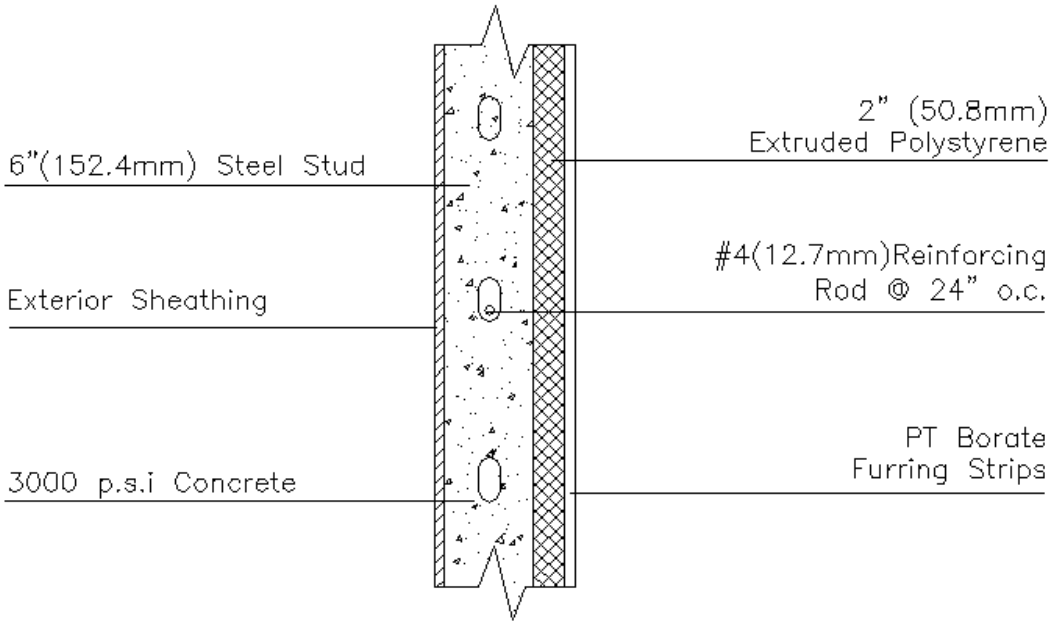
DETAIL 4

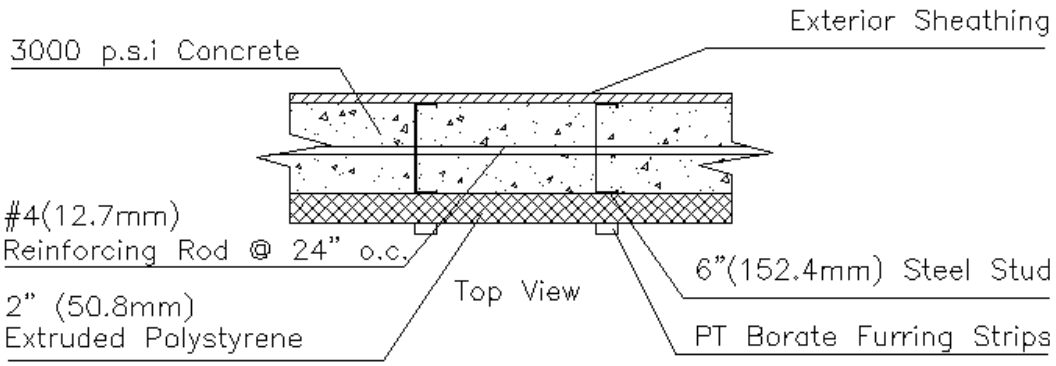




6" Thick Core
Non-Insulated Wall

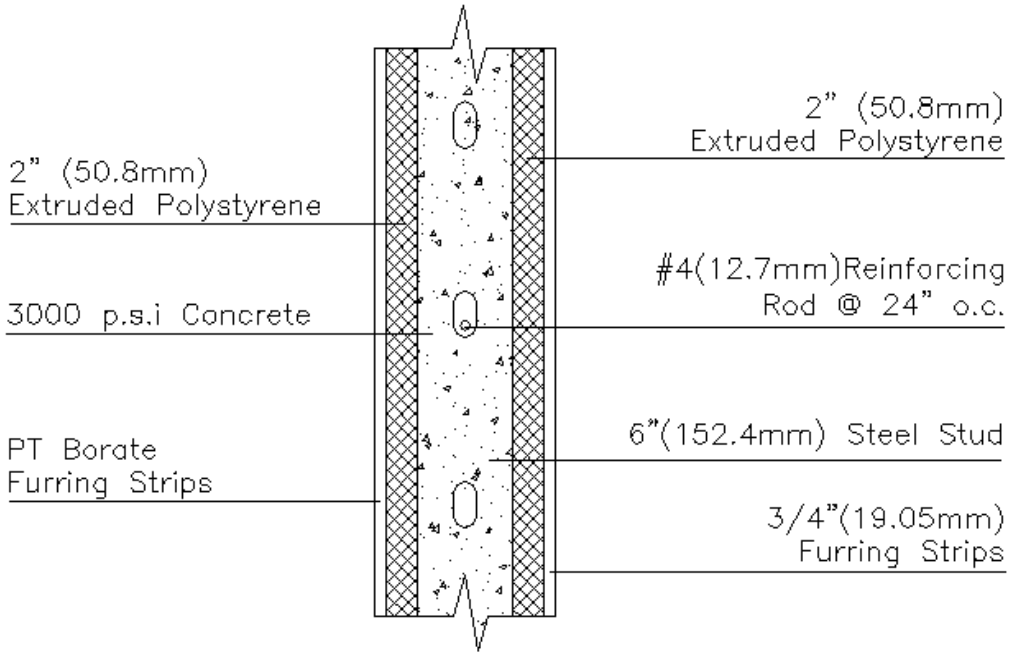
DETAIL 5

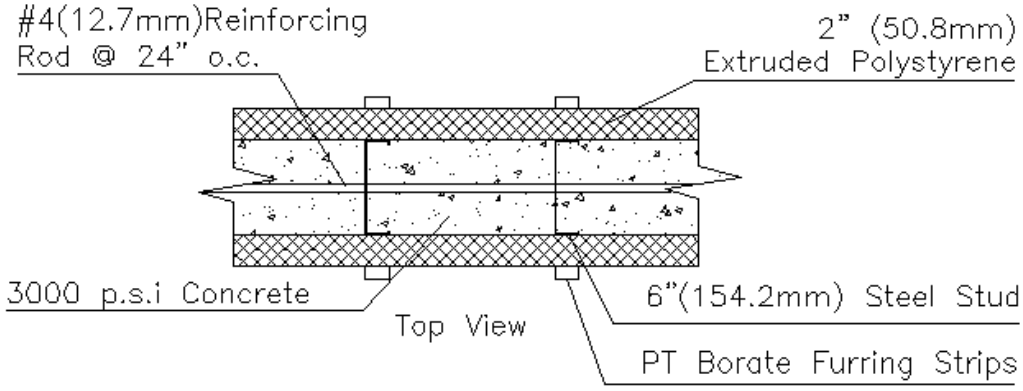




6" Thick Core
Insulated Wall

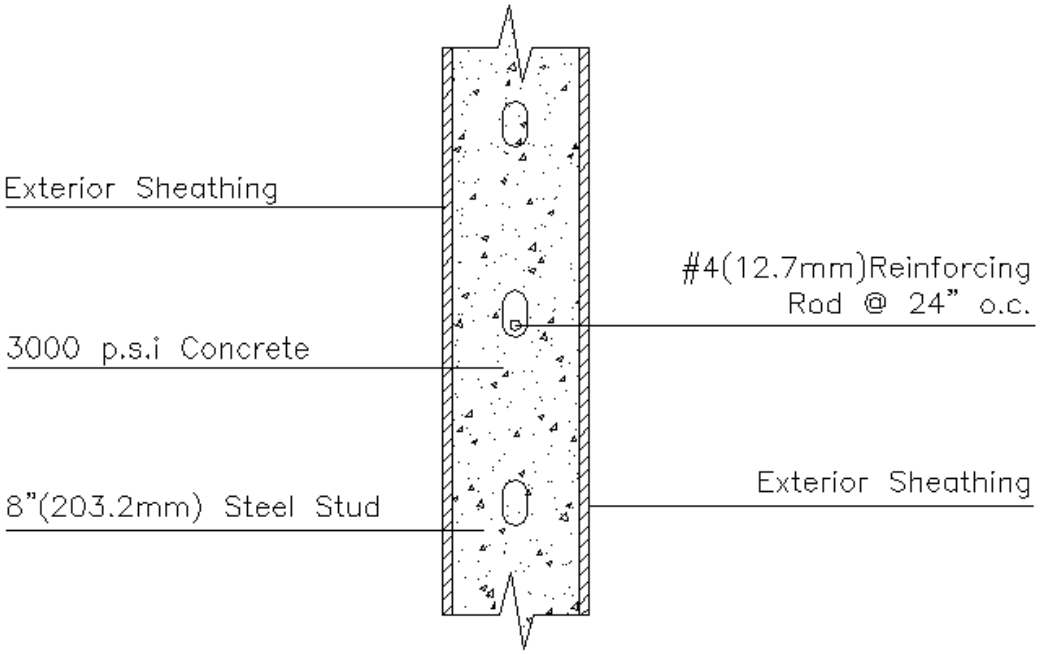
DETAIL 6

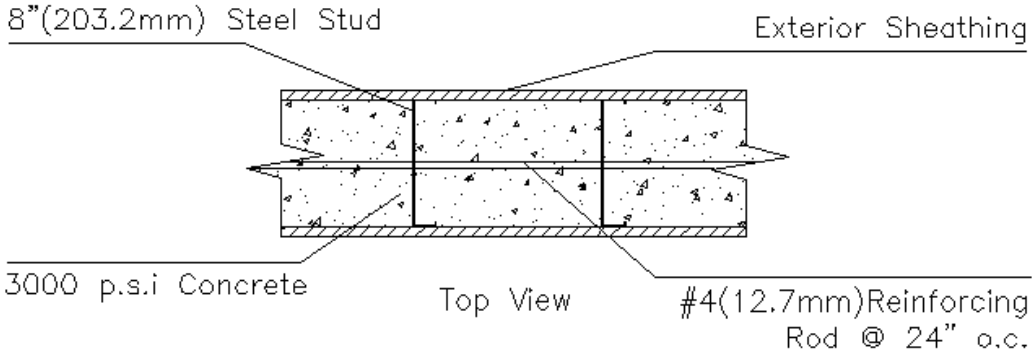




6" Thick Core
Double Insulated Wall

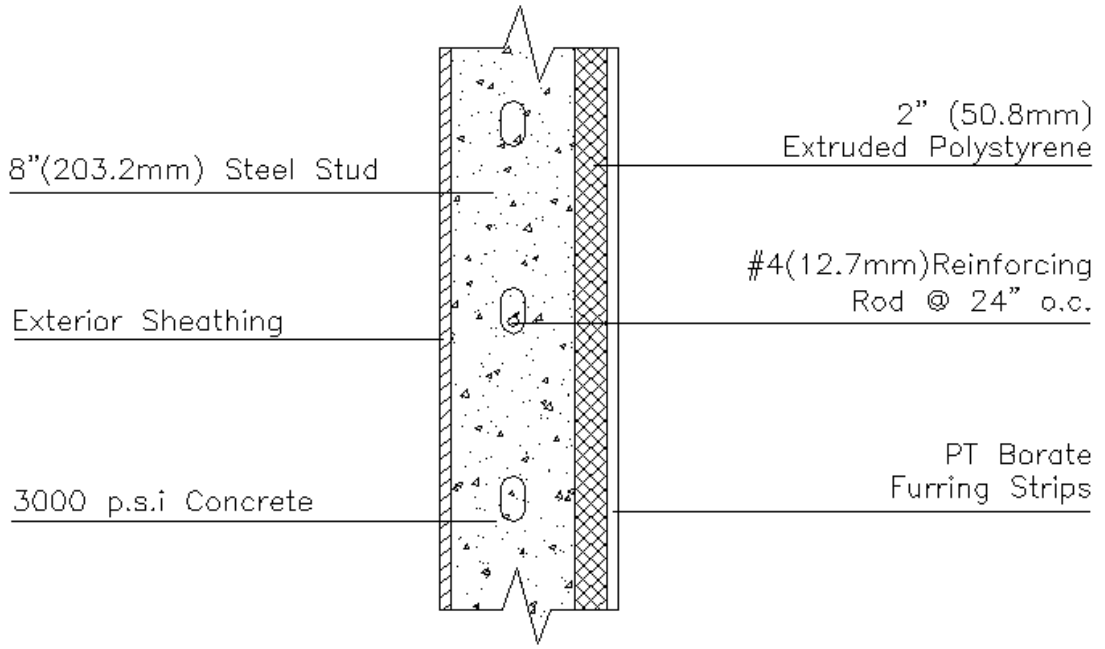
DETAIL 7

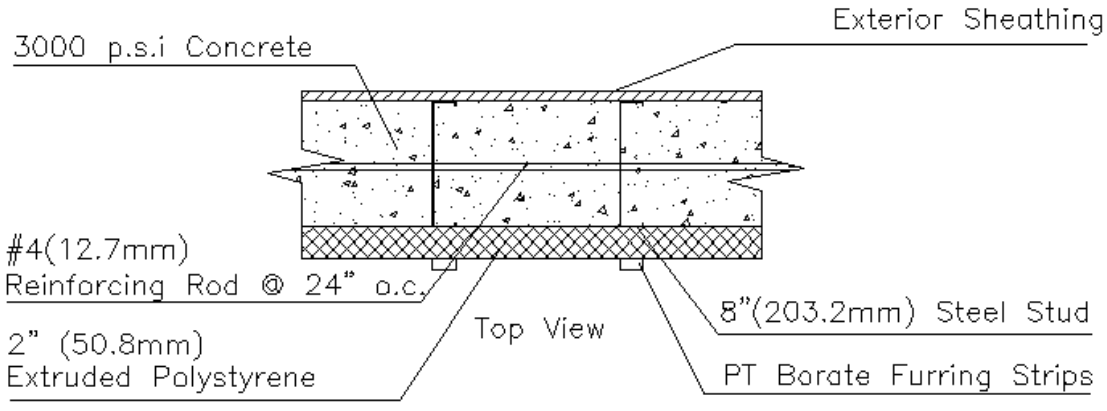




8" Thick Core
Non-Insulated Wall

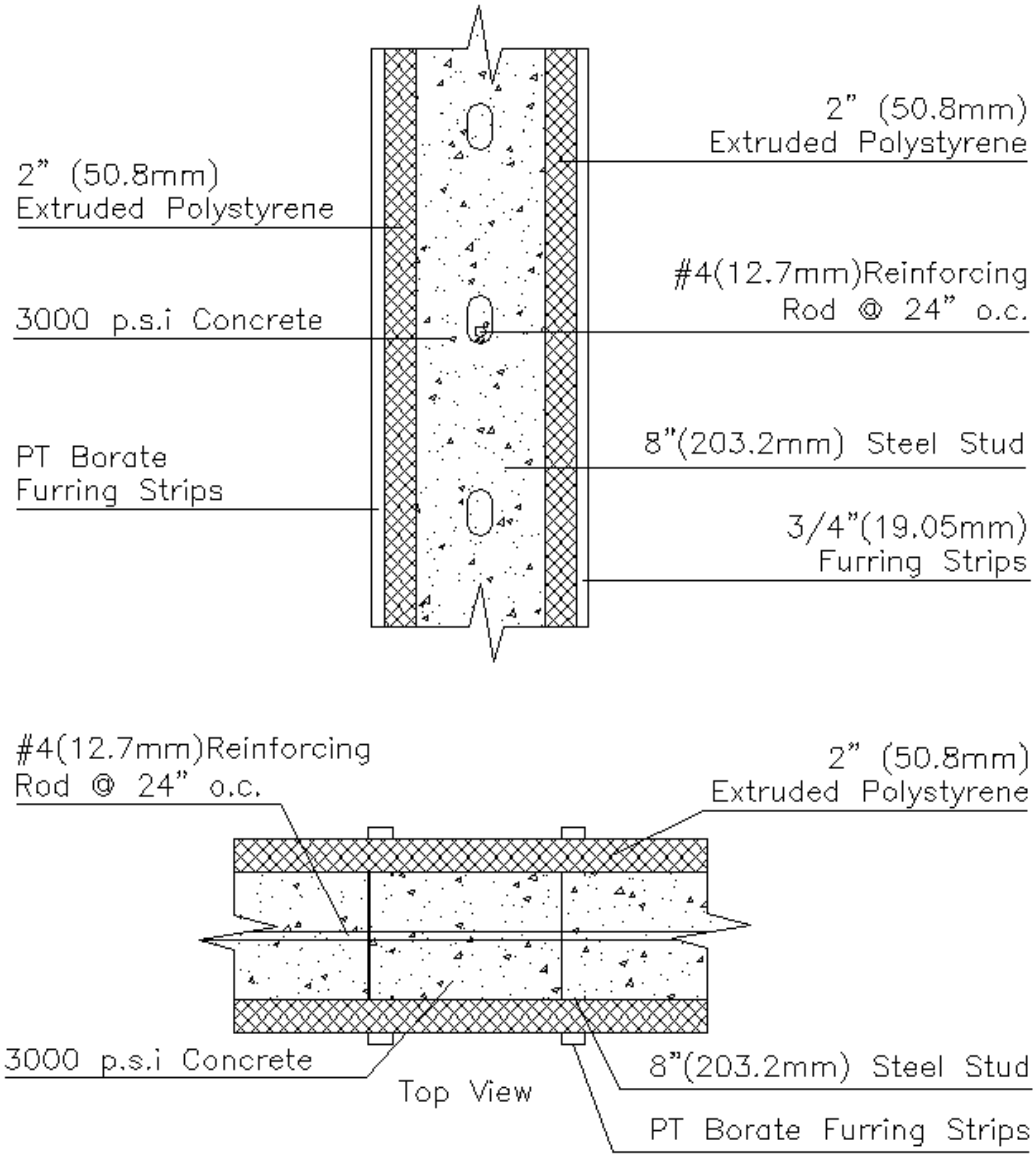
DETAIL 8





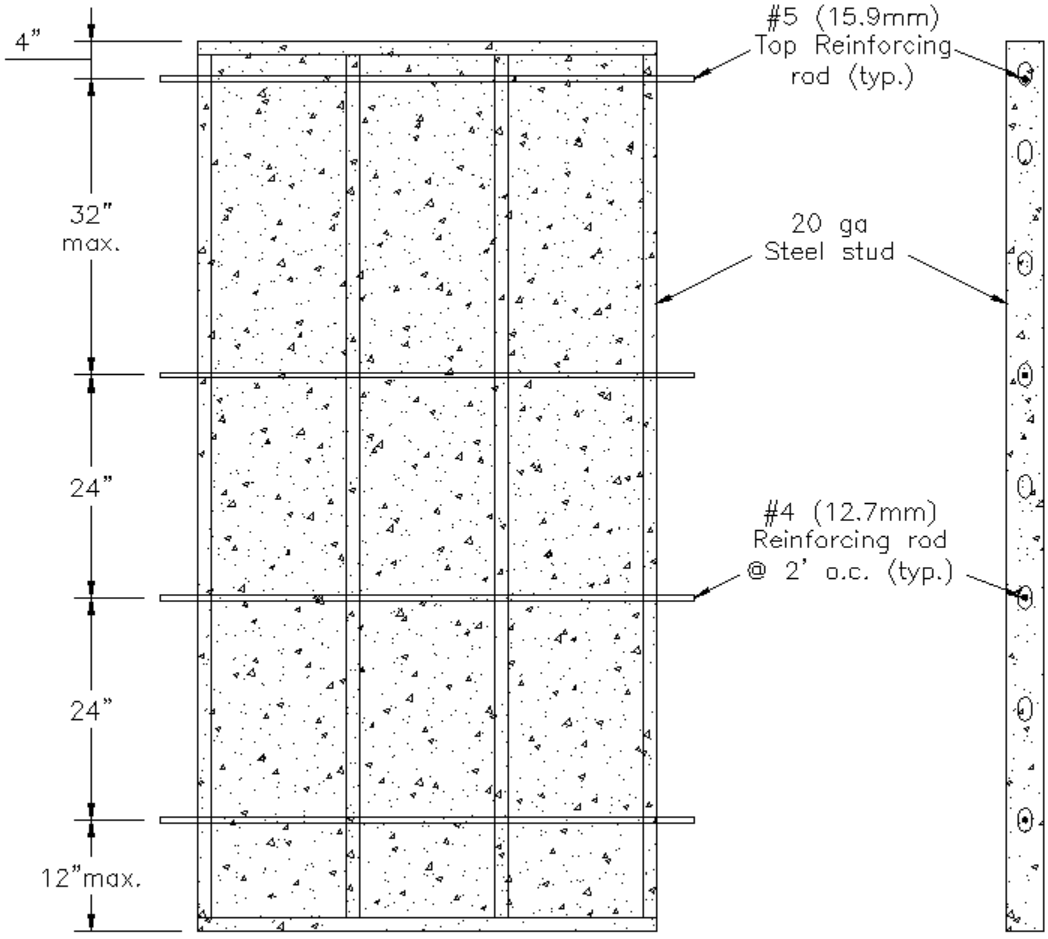
8" Thick Core
Insulated Wall

DETAIL 9



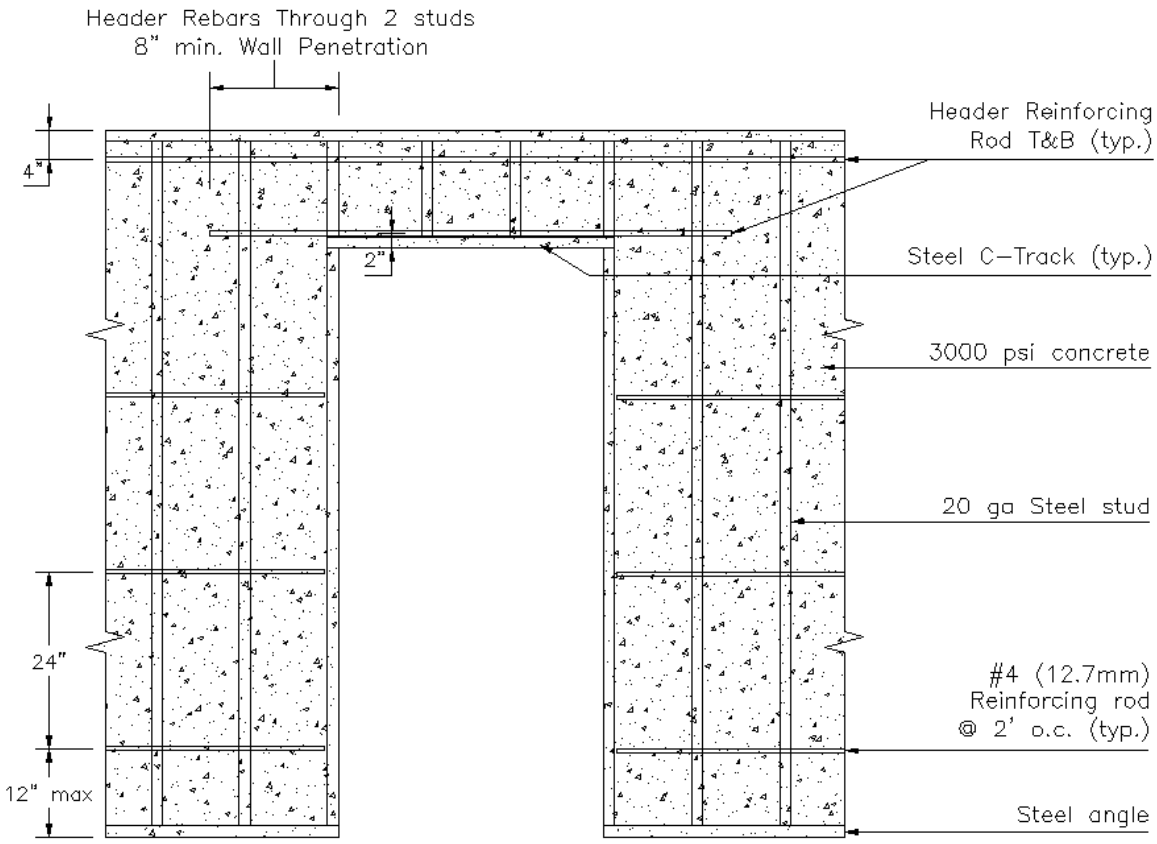
8" Thick Core
Double Insulated Wall

DETAIL 10



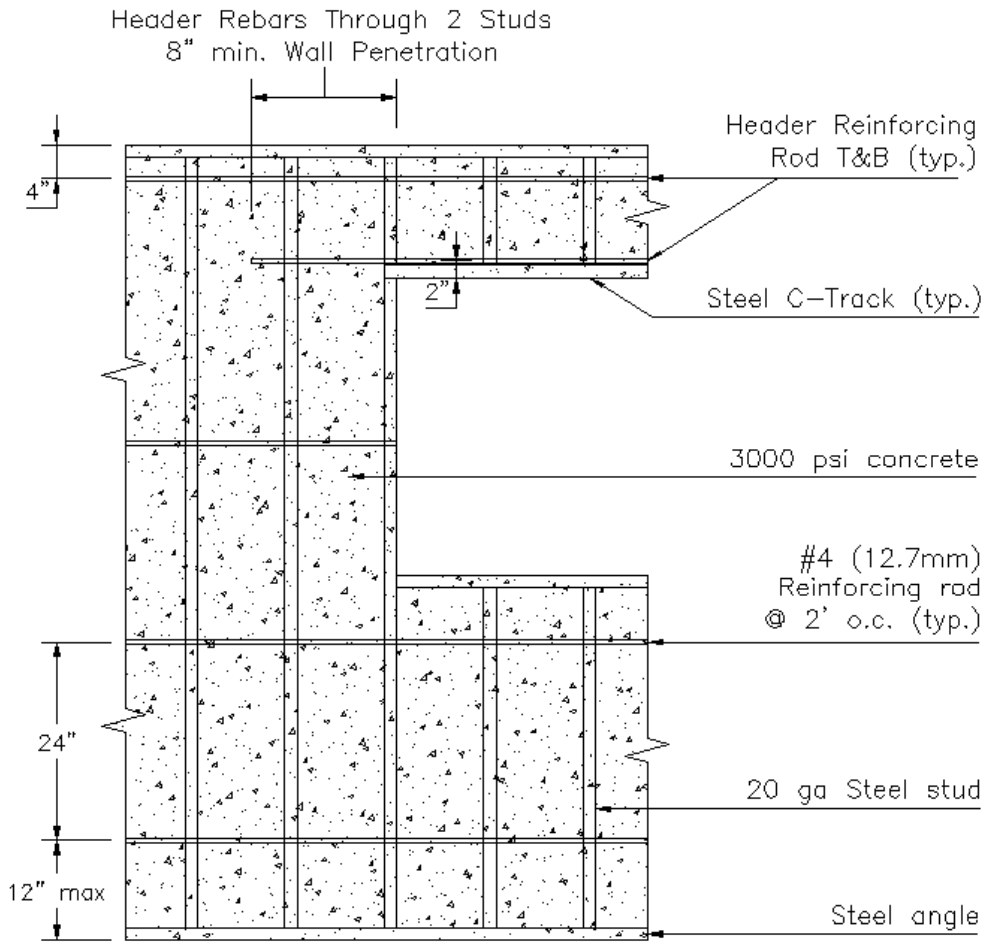
Wall Panel Reinforcement Placement (typ.)

DETAIL 11



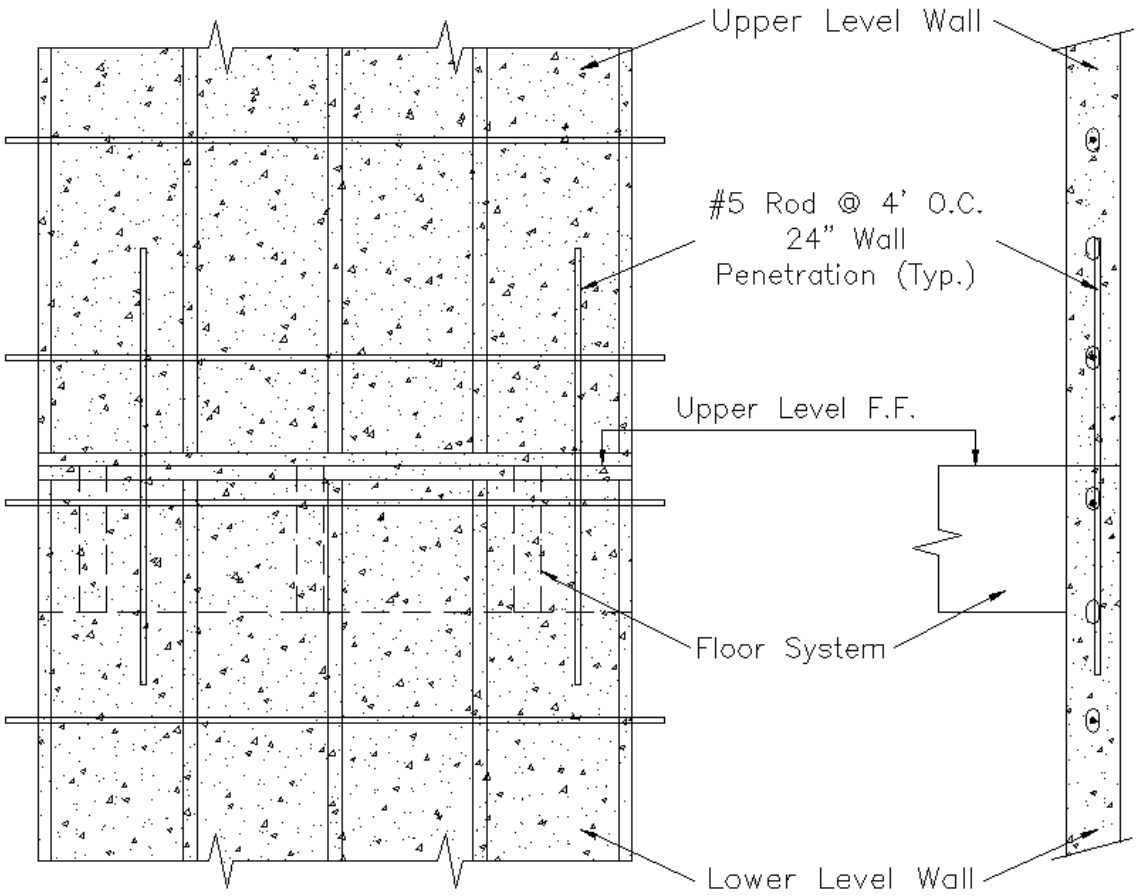
Door Opening Panel Reinforcement (typ.)

DETAIL 12



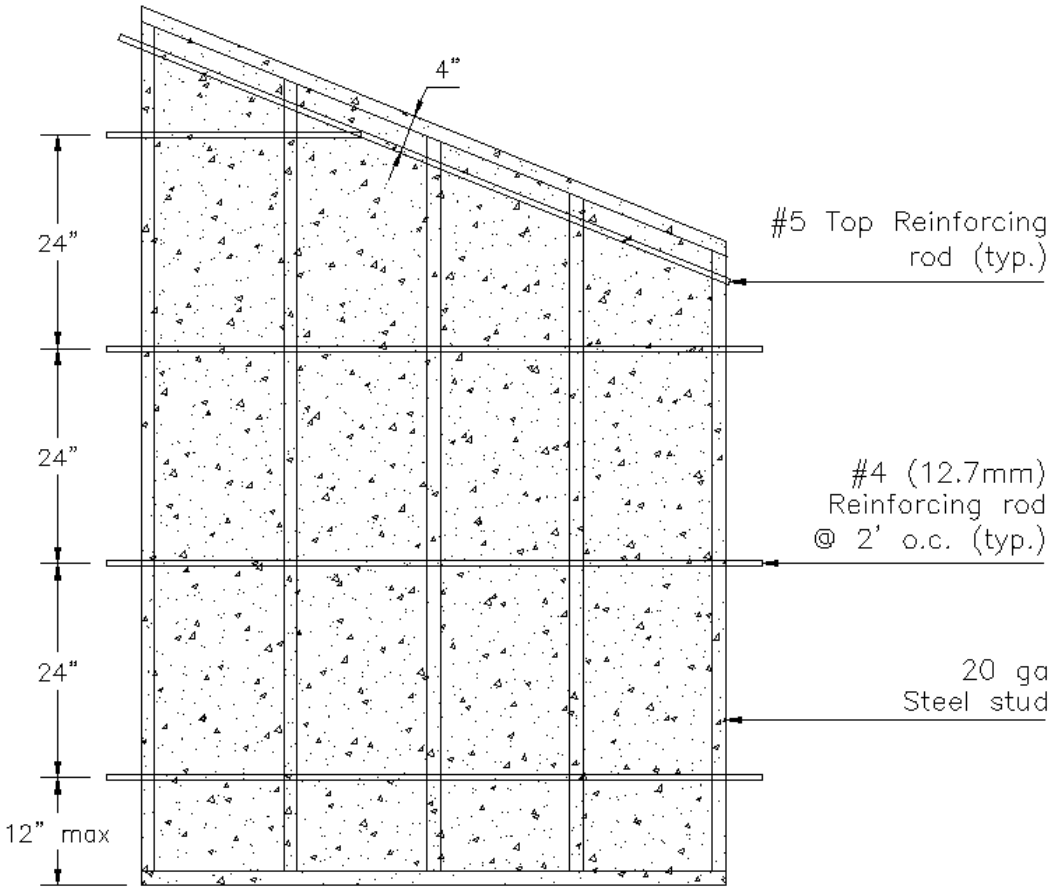
Window Opening Panel Reinforcement (typ.)

DETAIL 13



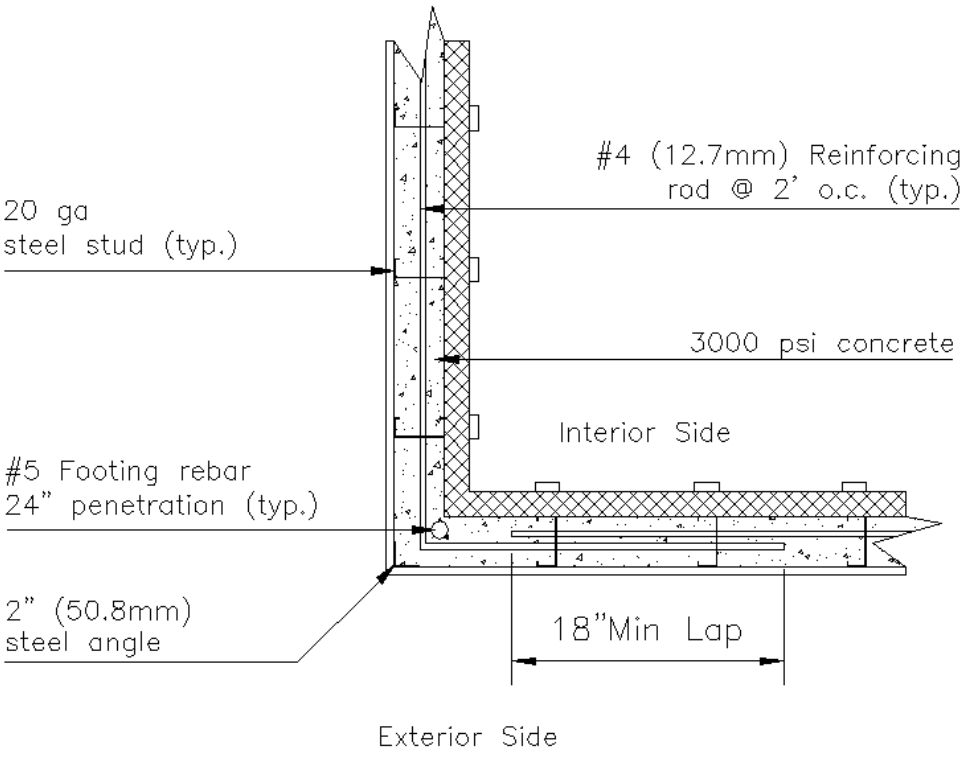
Two Level Panels Connection (typ.)

DETAIL 14



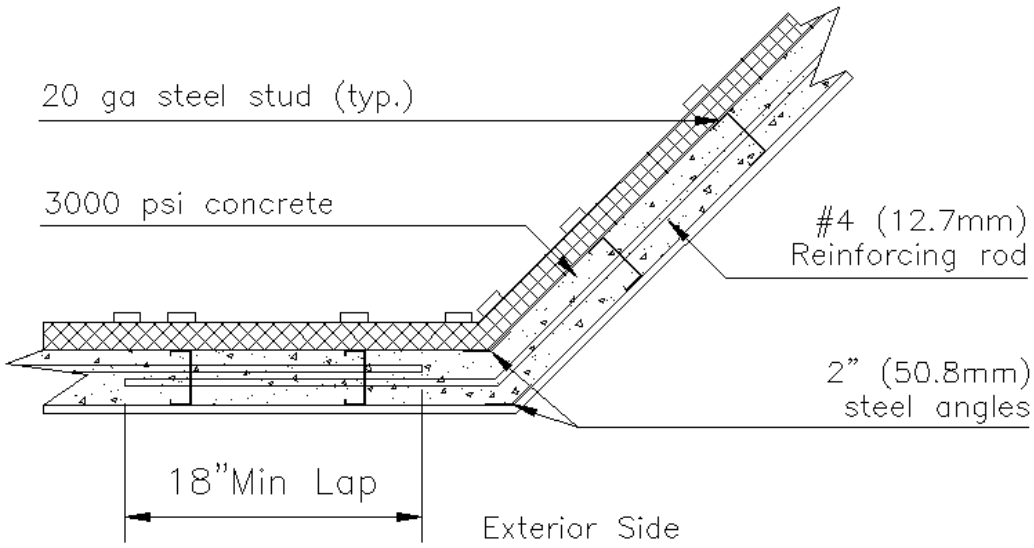
Rake Wall Reinforcement Placement (typ.)

DETAIL 15



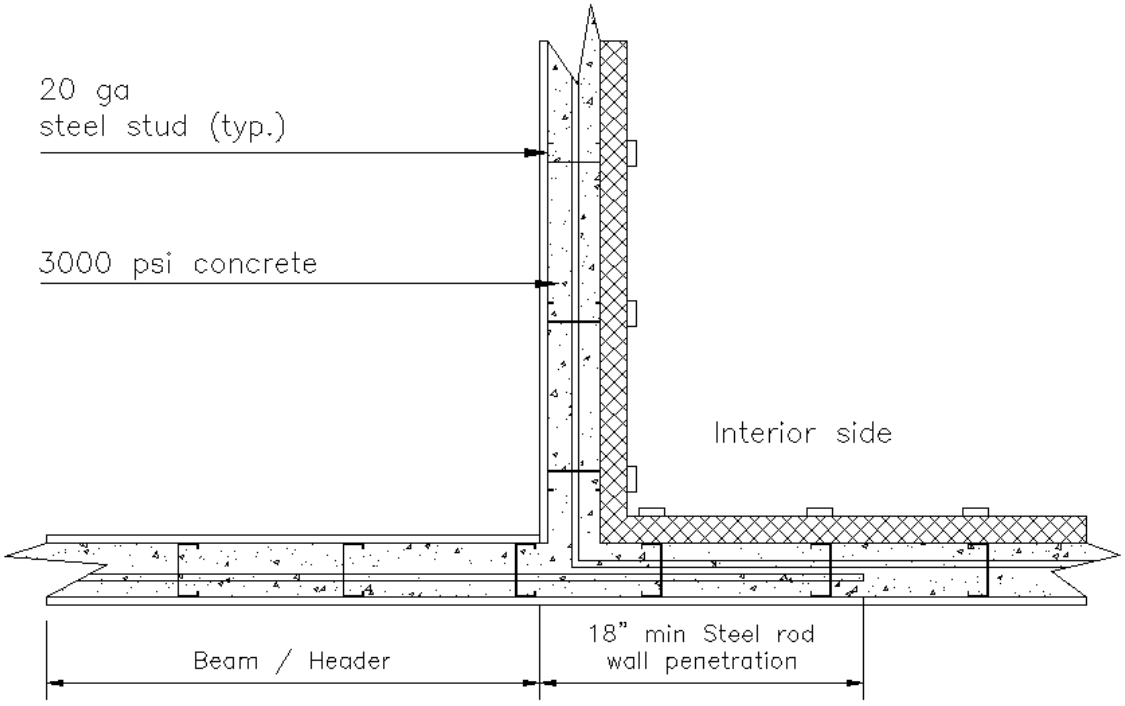
Plan Detail
90 Degree Corner (typ.)

DETAIL 16



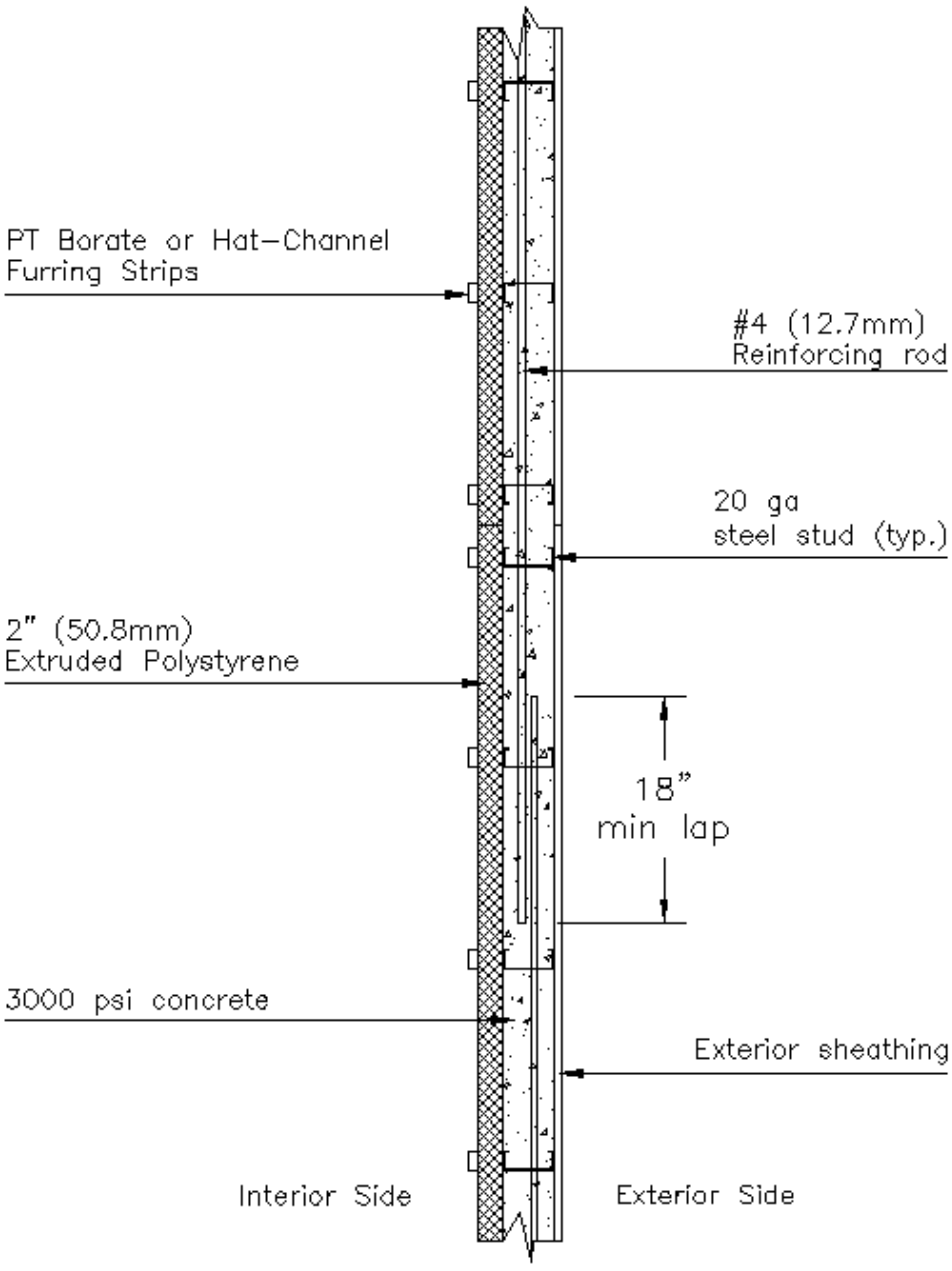
Plan Detail
45 Degree Corner (typ.)

DETAIL 17



Beam to Corner Connection (typ.)

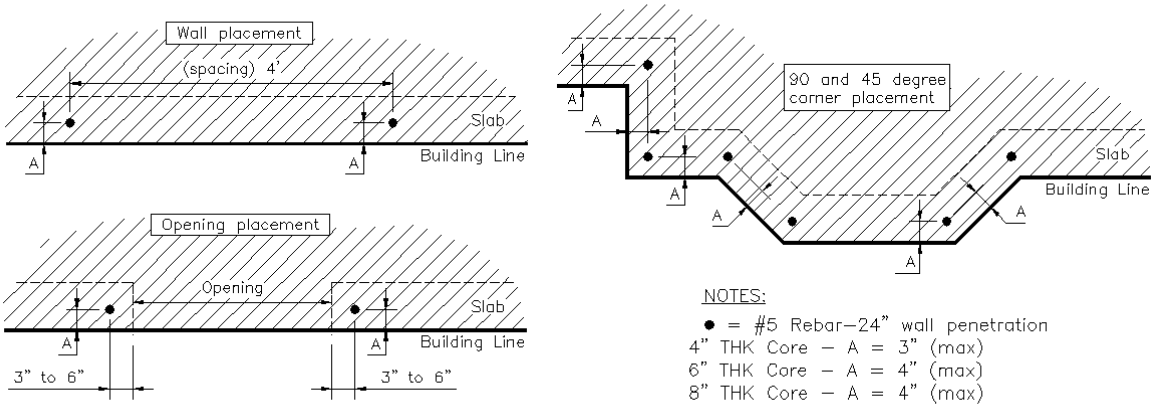
DETAIL 18

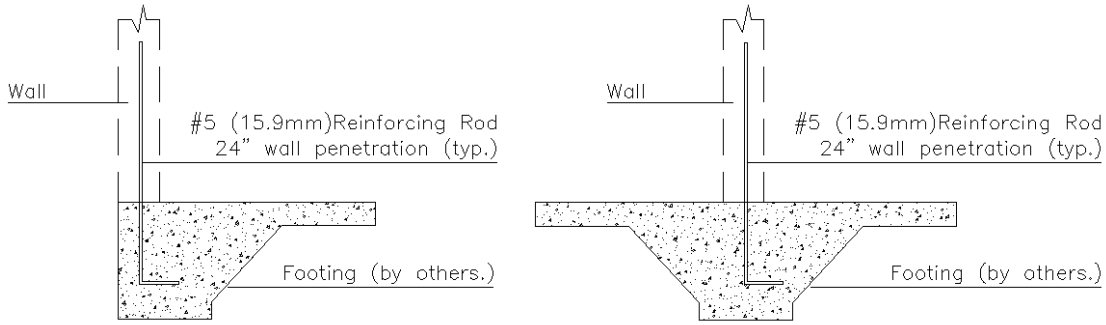


Plan Detail
Panels Connection (typ.)

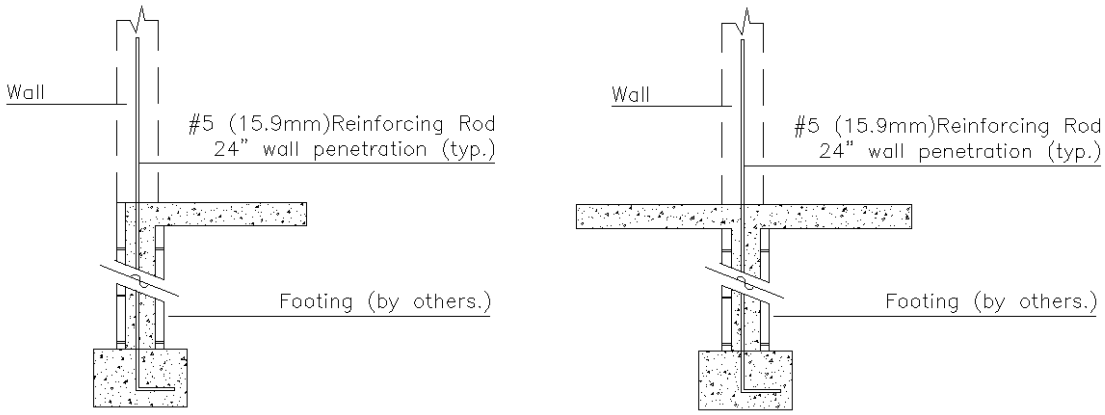
DETAIL 19

Vertical Dowel Placement for Footing — Wall Connection





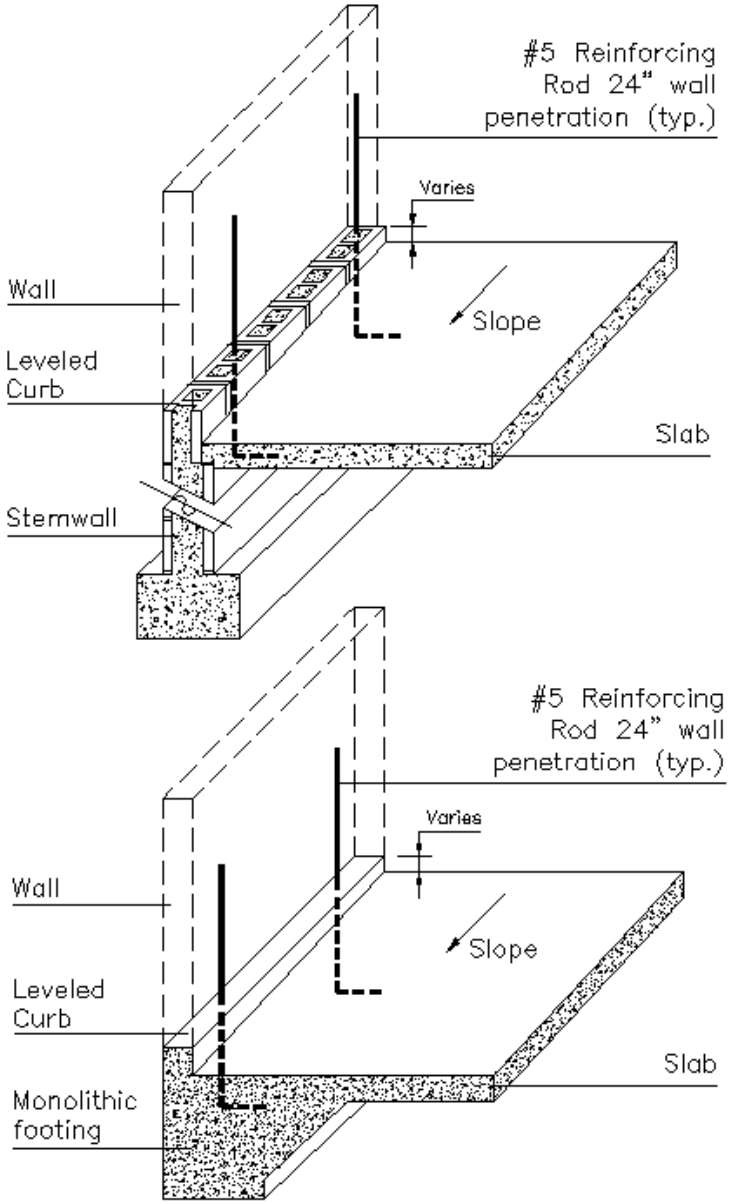
Monolithic Footing



Stem-Wall Footing

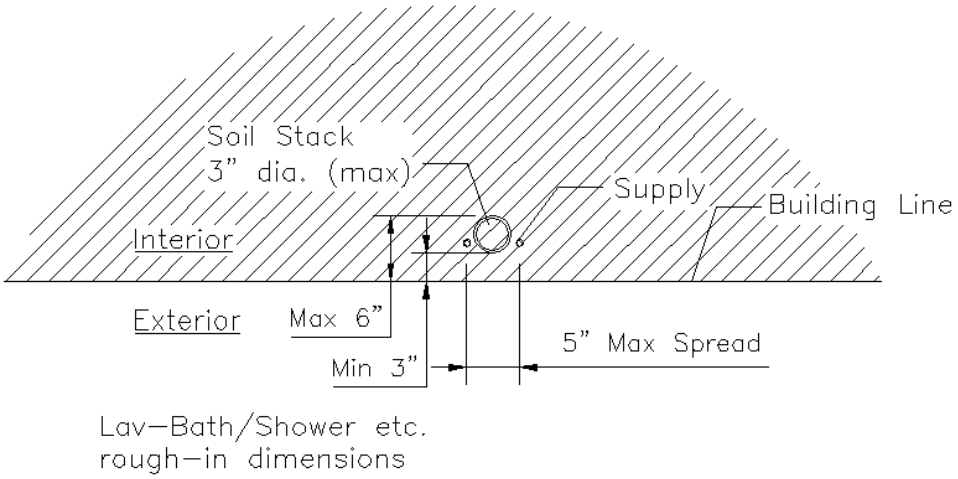
GENERAL DETAILS

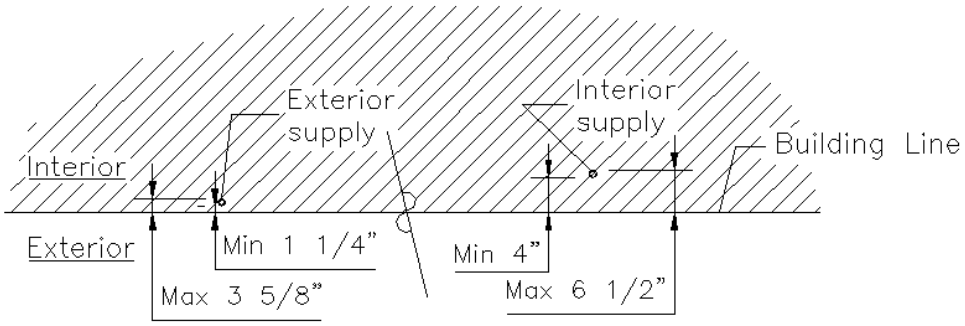
DETAIL 20



Monolithic/Stem-wall Curb
With Sloped Slab Detail (Typ.)

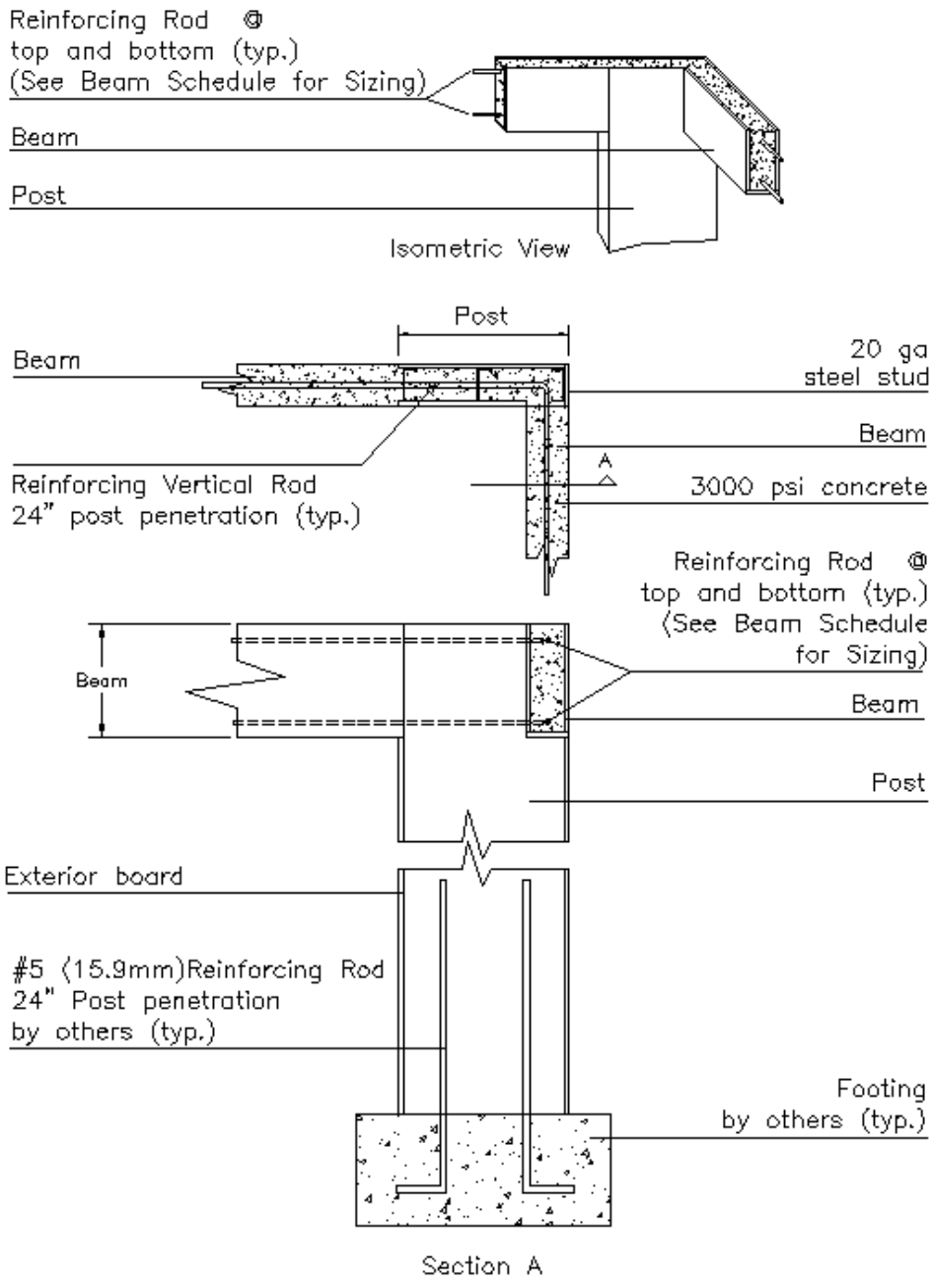
DETAIL 21





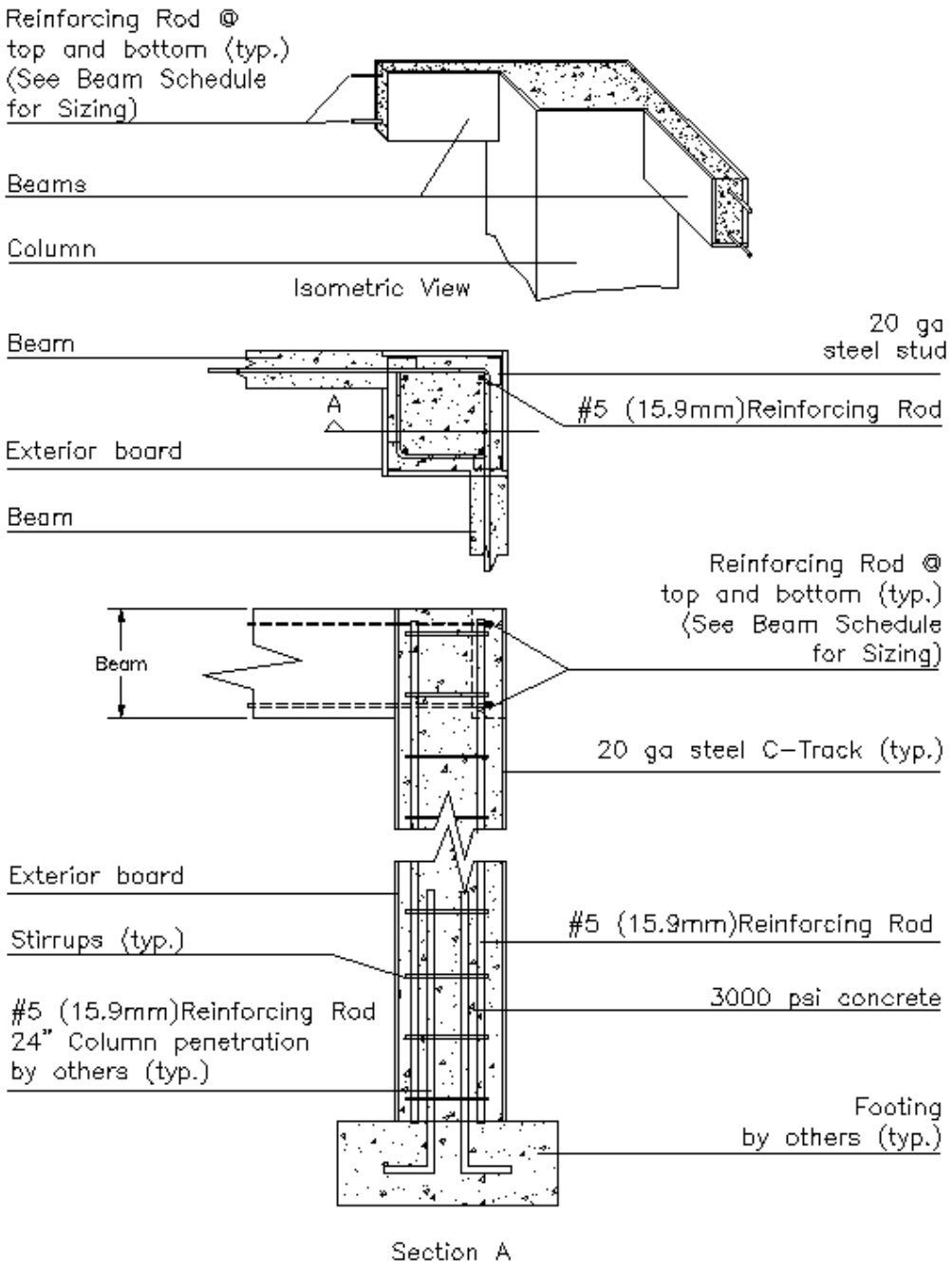
Plan View Detail
Plumbing Rough-in (typ.)

DETAIL 22



Post Detail
w/ Beam & Footing (typ.)

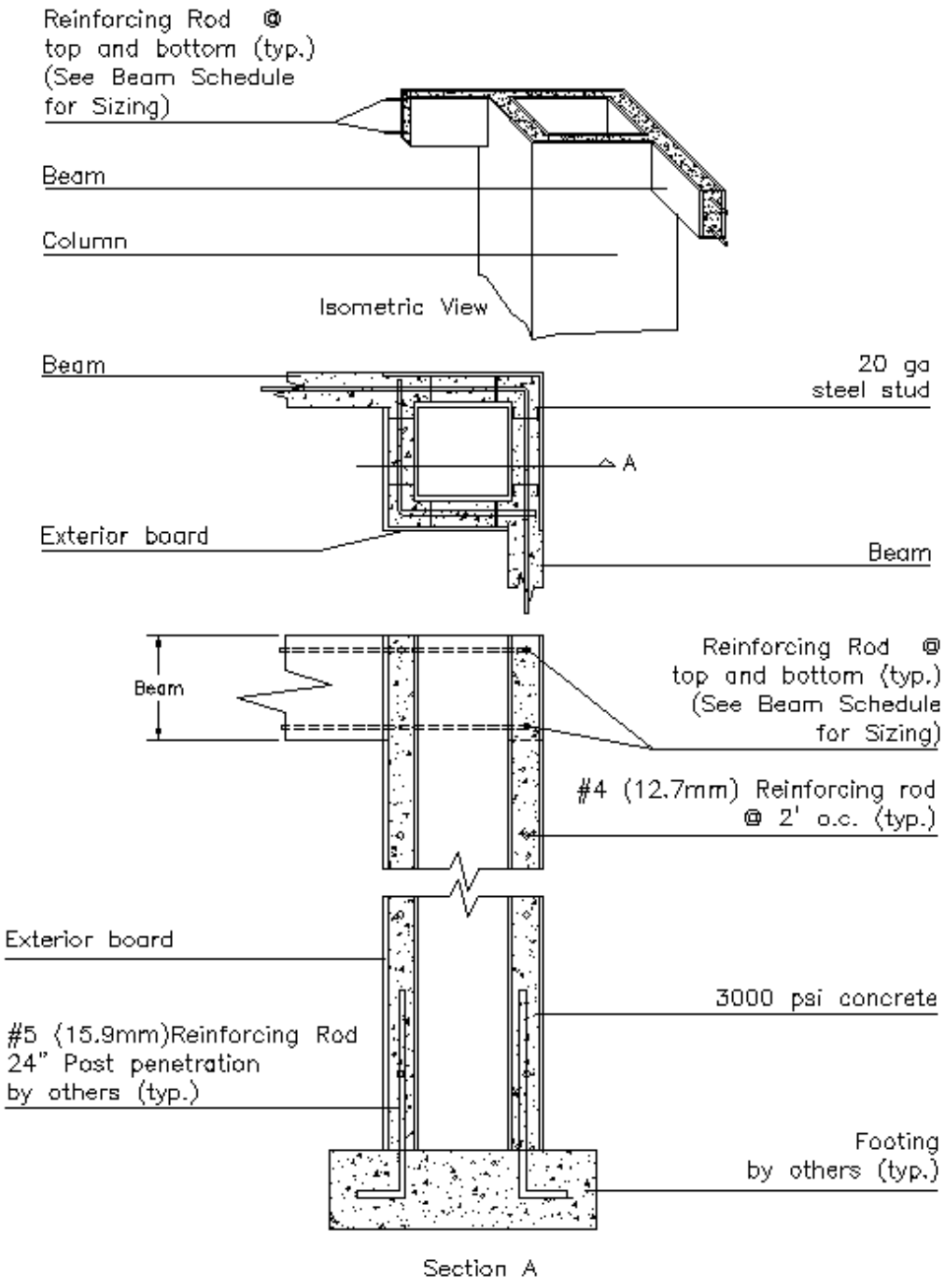
DETAIL 23



Square Column up to 20"
w/ Beam & Footing (typ.)

GENERAL DETAILS

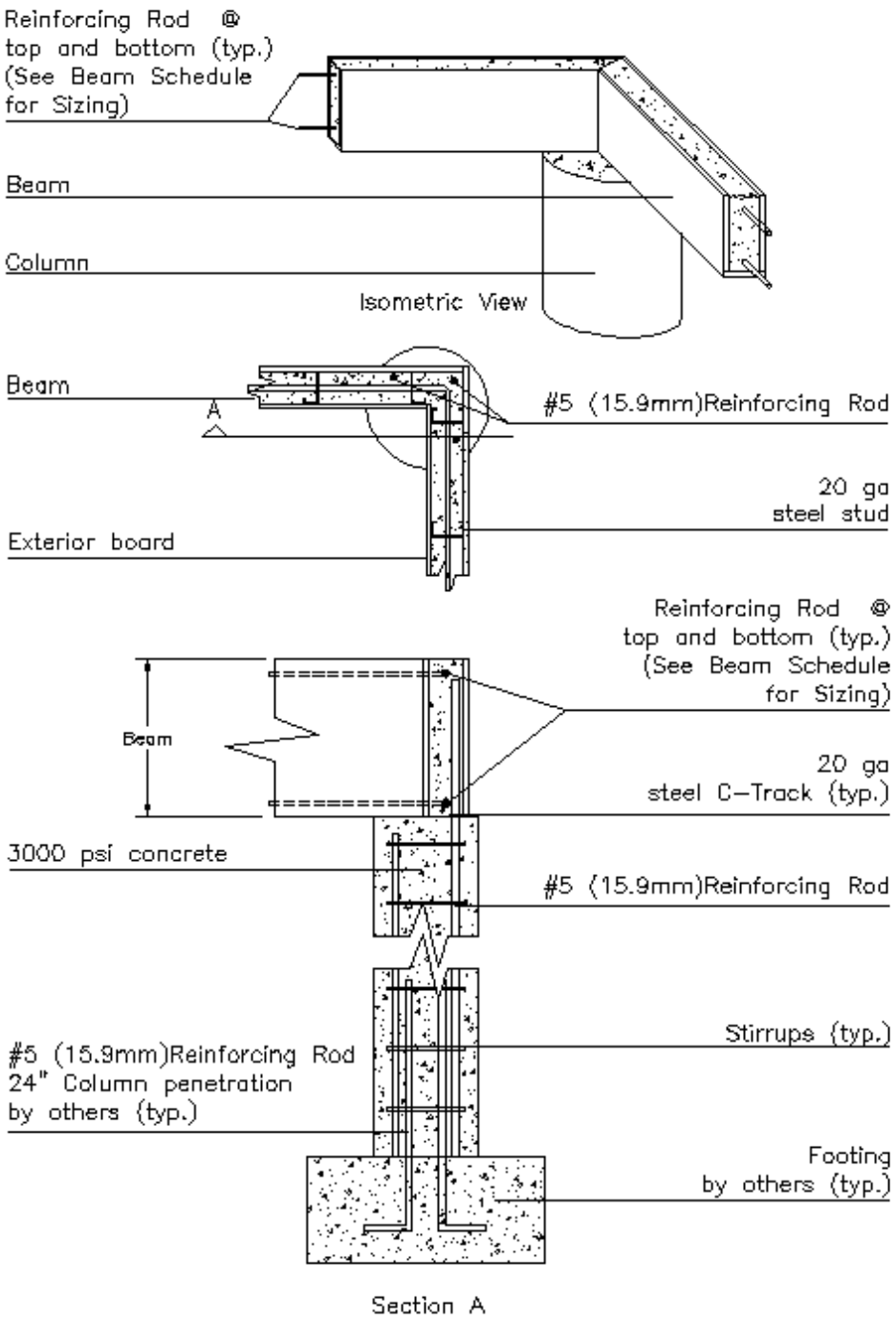
DETAIL 24



Over 20" Square Column w/ Beam & Footing (typ.)

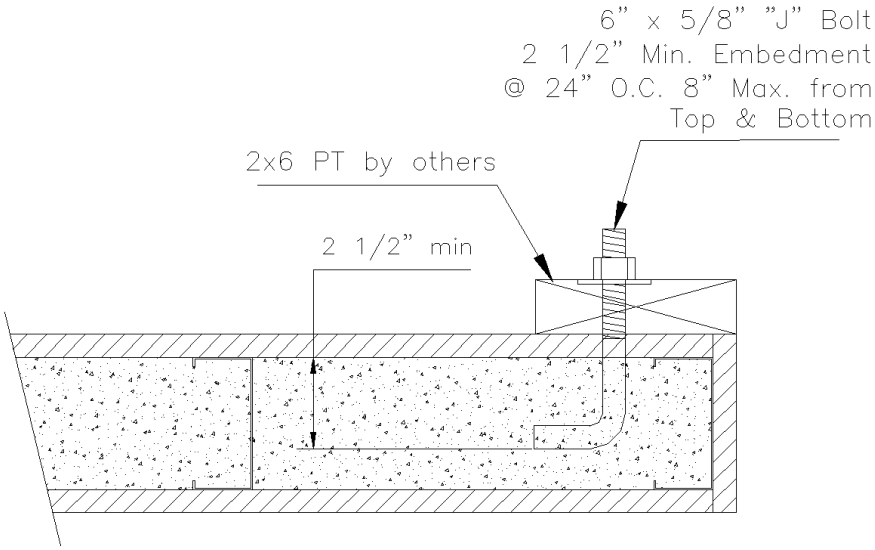
GENERAL DETAILS

DETAIL 25



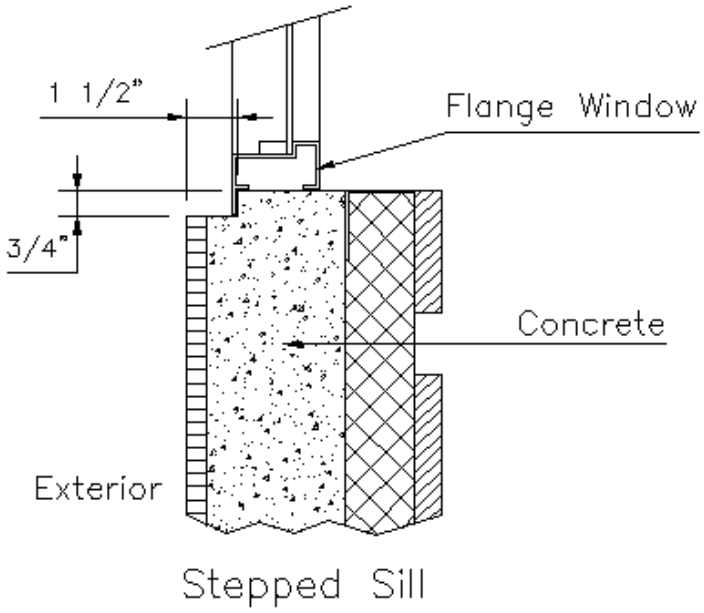
Round Column
w/ Beam & Footing (typ.)

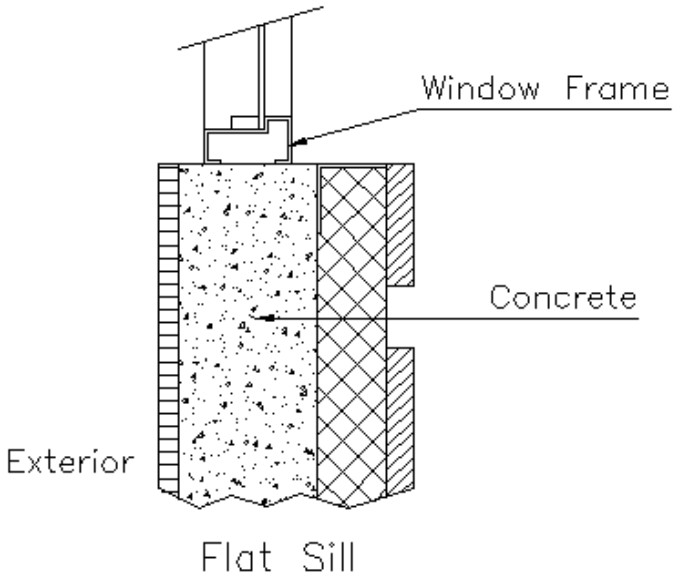
DETAIL 26



Garage Door Jamb (typ.)

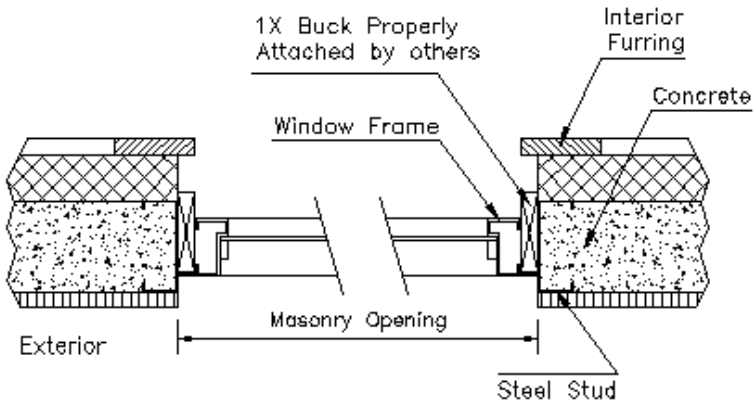
DETAIL 27

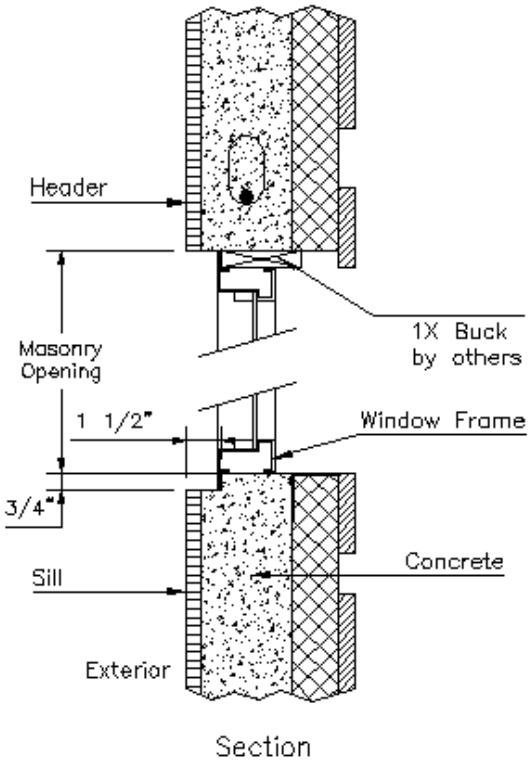




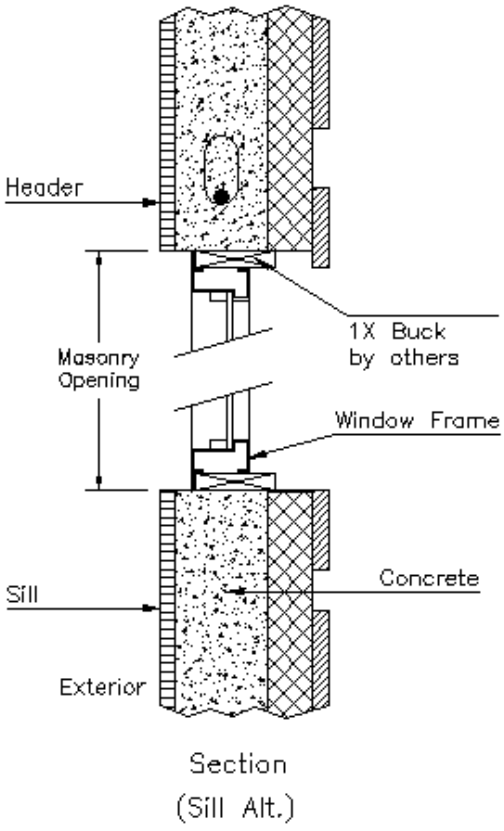
Window Sill Details (typ.)

DETAIL 28





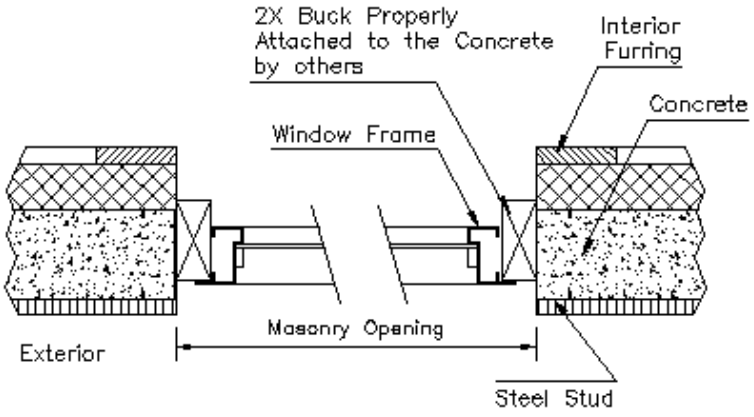
Section

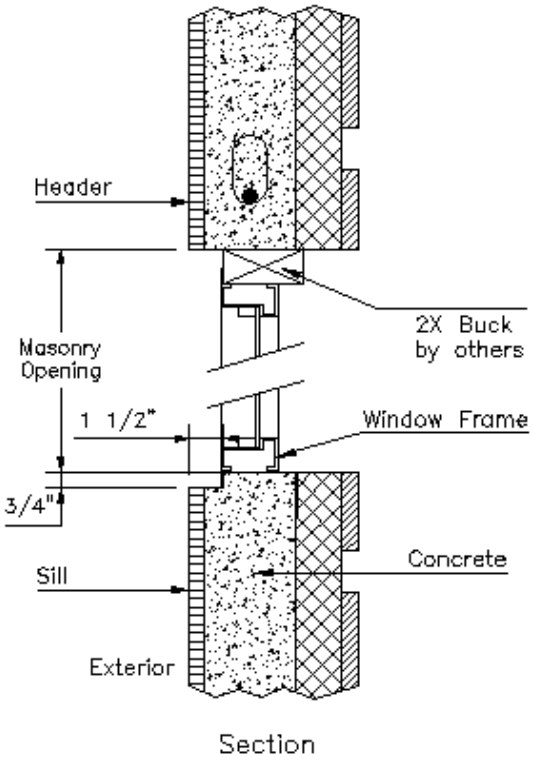


Section
(Sill Alt.)

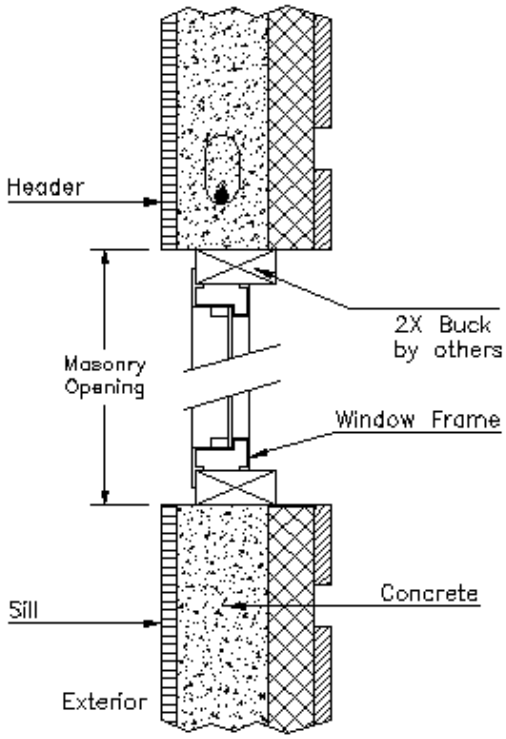
Window Opening w/
1X Buck Detail (typ.)

DETAIL 29





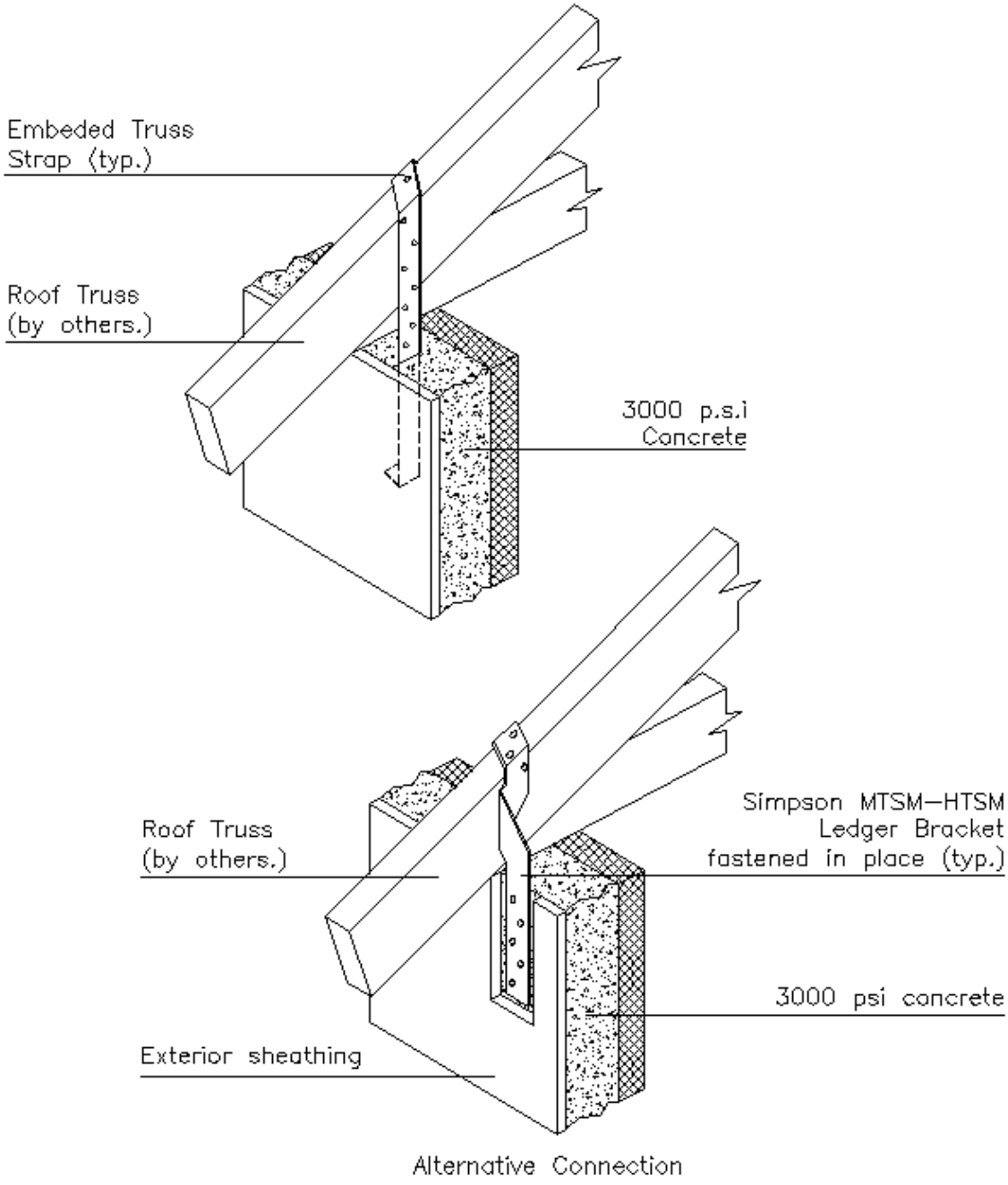
Section



Section
(Sill Alt.)

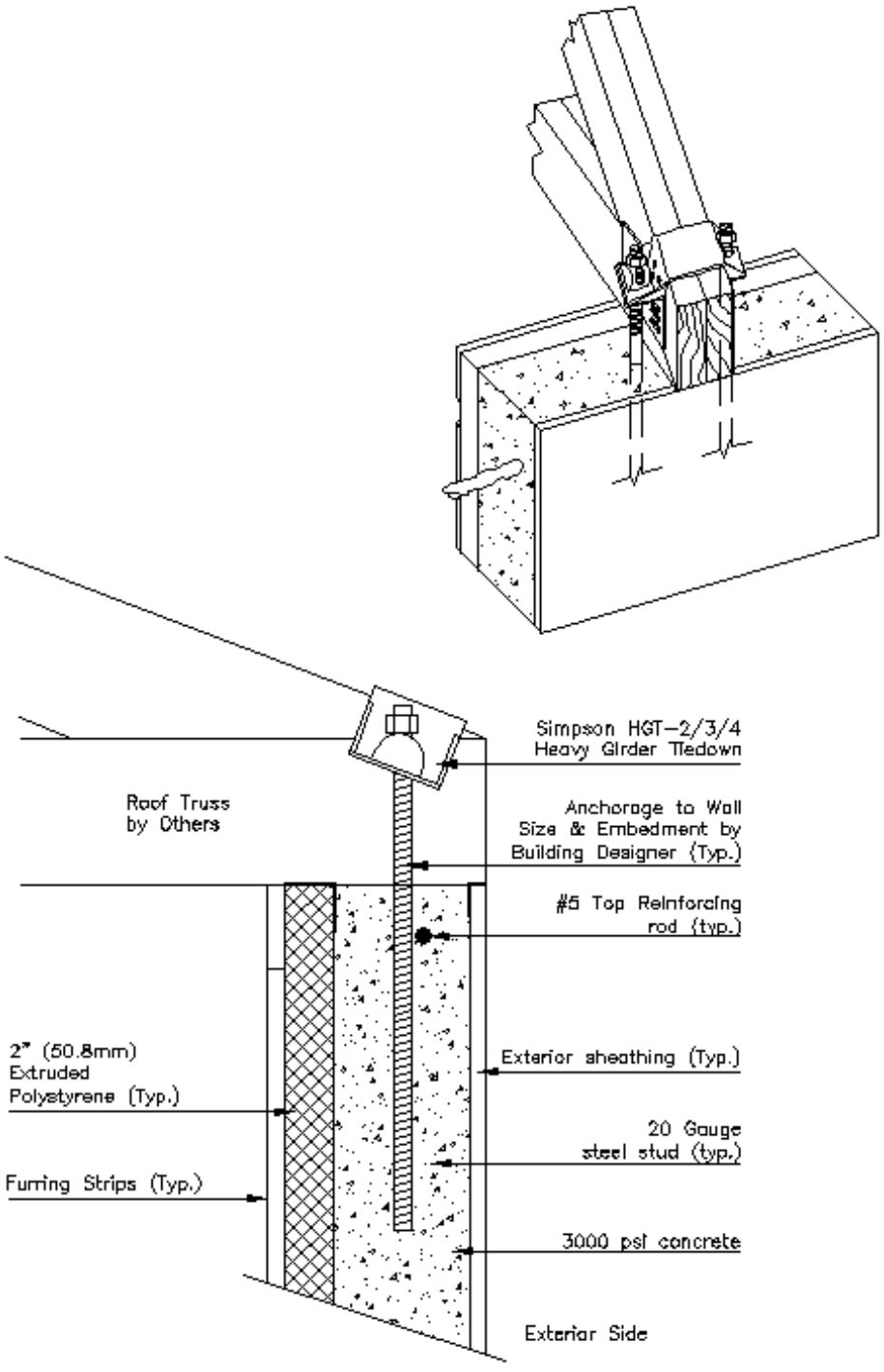
Window Opening w/ 2X Buck Detail (typ.)

DETAIL 30



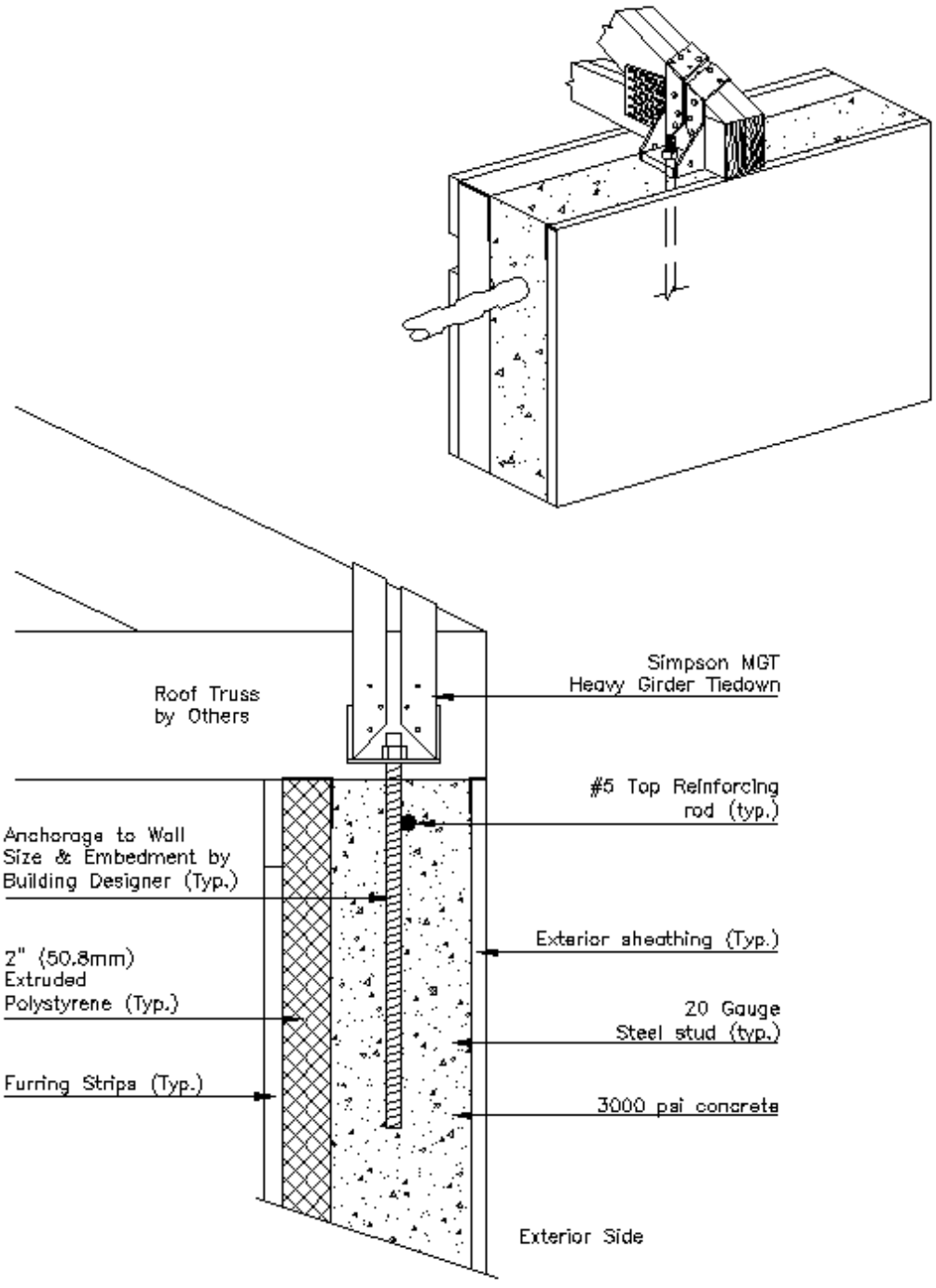
Roof Truss Connection (typ.)

DETAIL 31



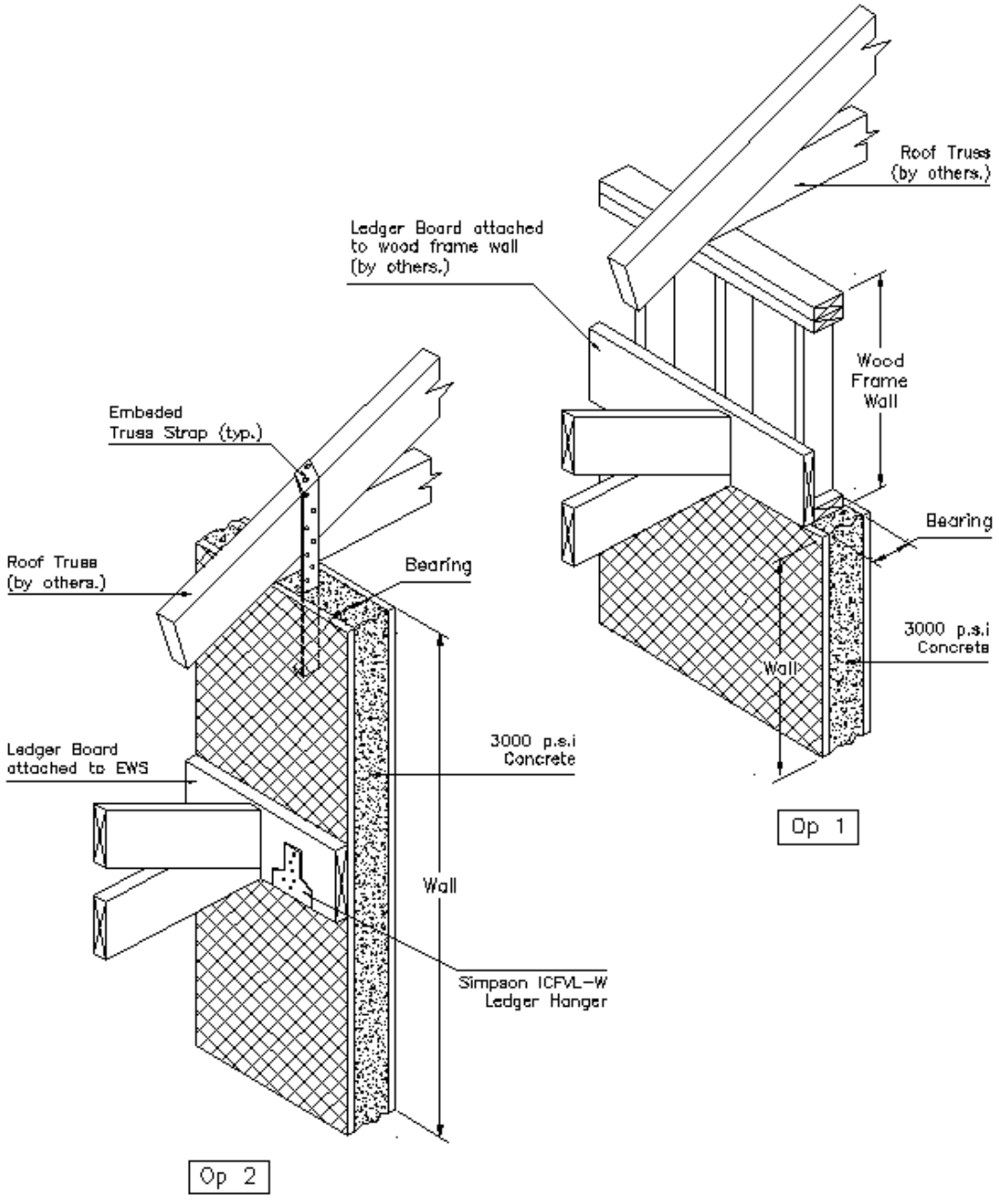
Roof Girder Connection w/ Simpson HGT Tie Down

DETAIL 32



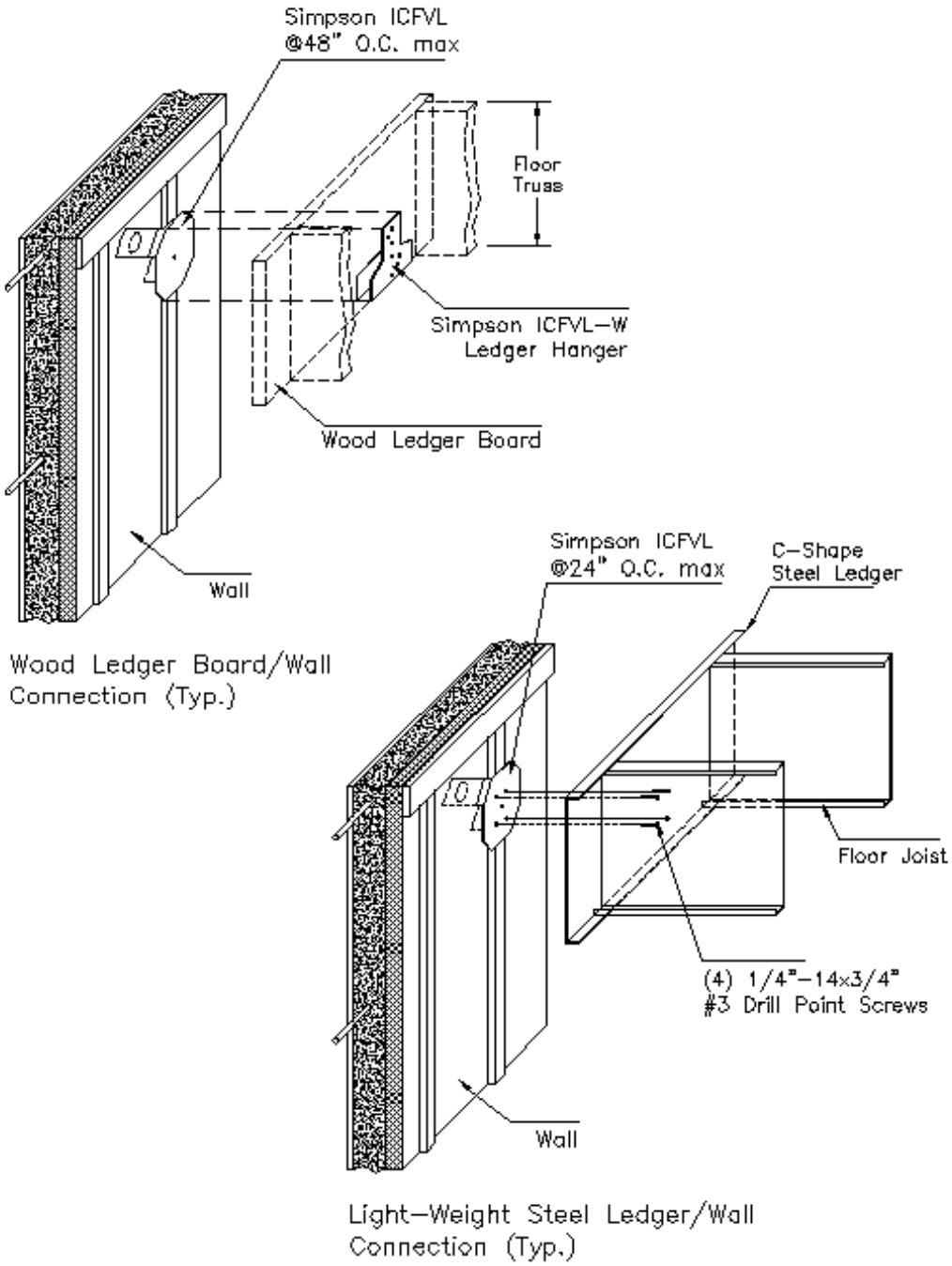
Roof Girder Connection w/ Simpson MGT Tie Down

DETAIL 33



Dual Bearing Detail (Typ.)

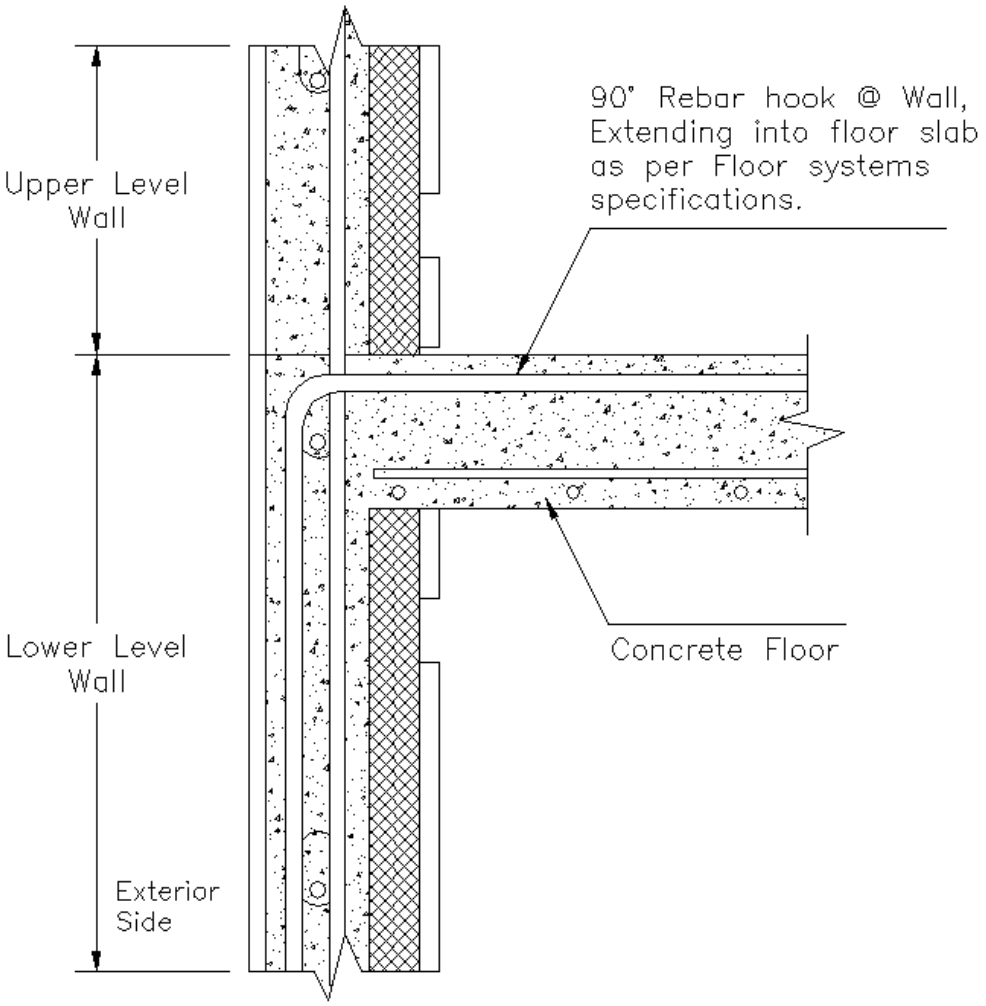
DETAIL 34



Note:
Simpson Connector to be installed per manufacturers specifications

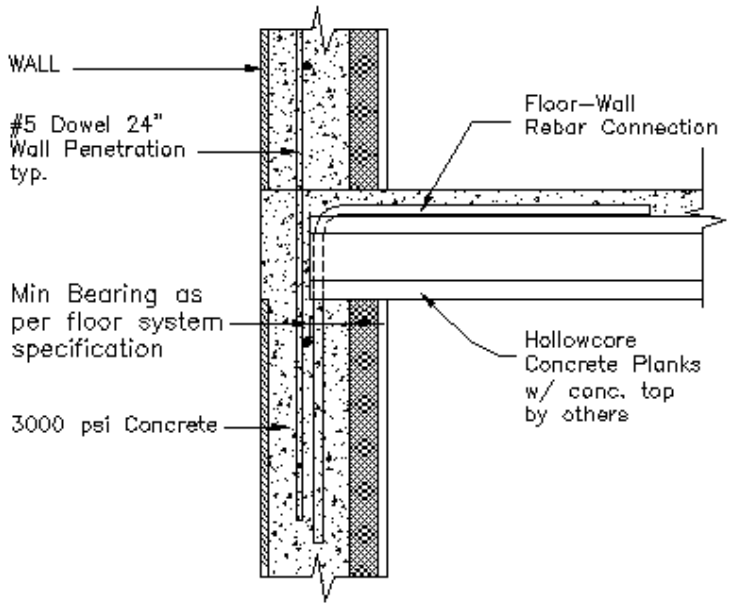
Simpson ICFVL / W
Ledger Connector Detail (typ.)

DETAIL 35

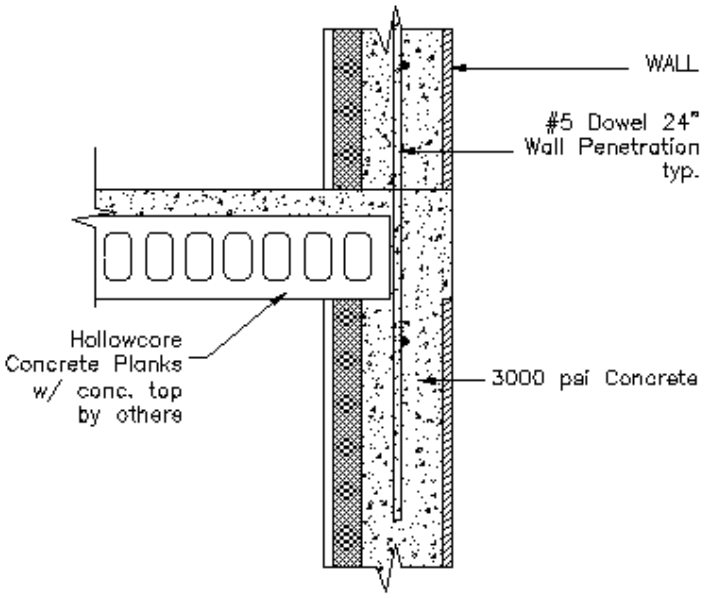


Cast in Place Concrete Floor to Wall connection Detail (typ.)

DETAIL 36



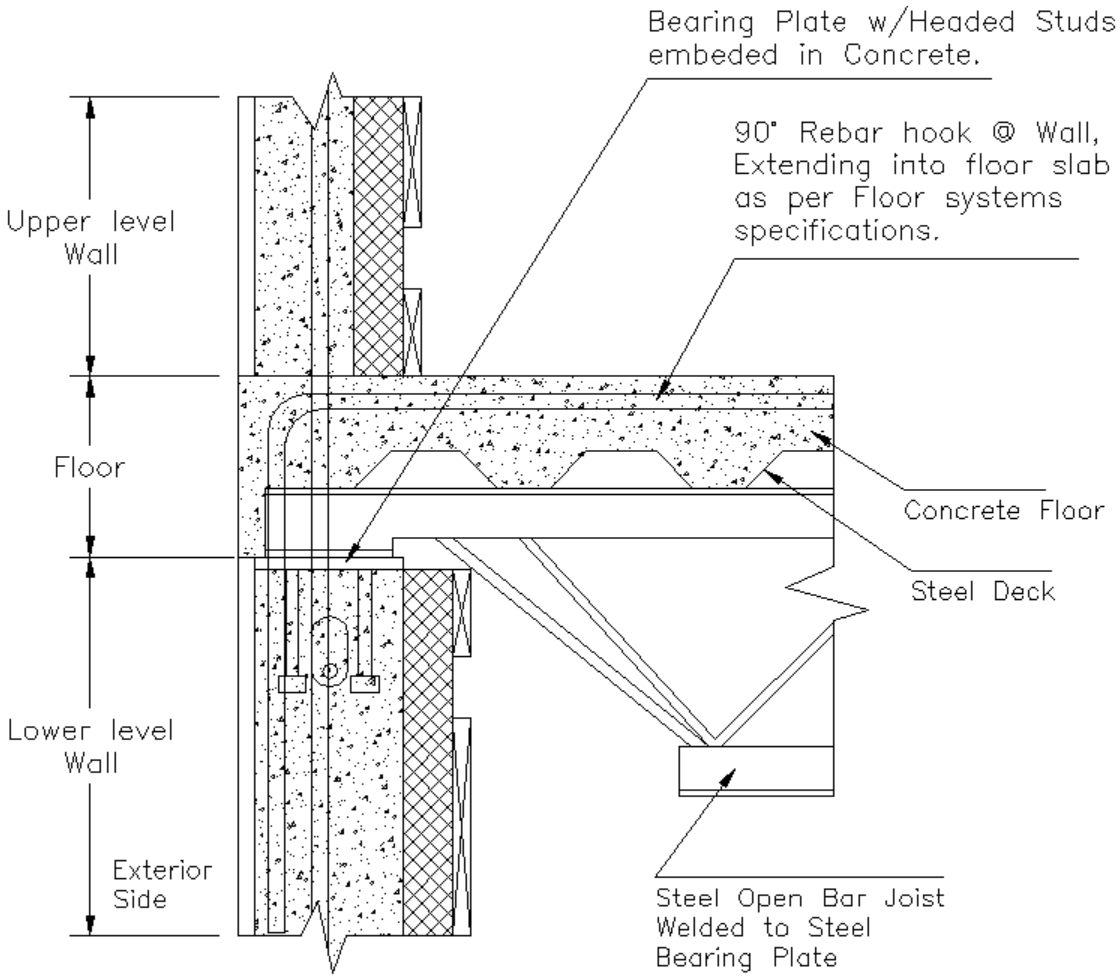
Bearing connection



Side connection

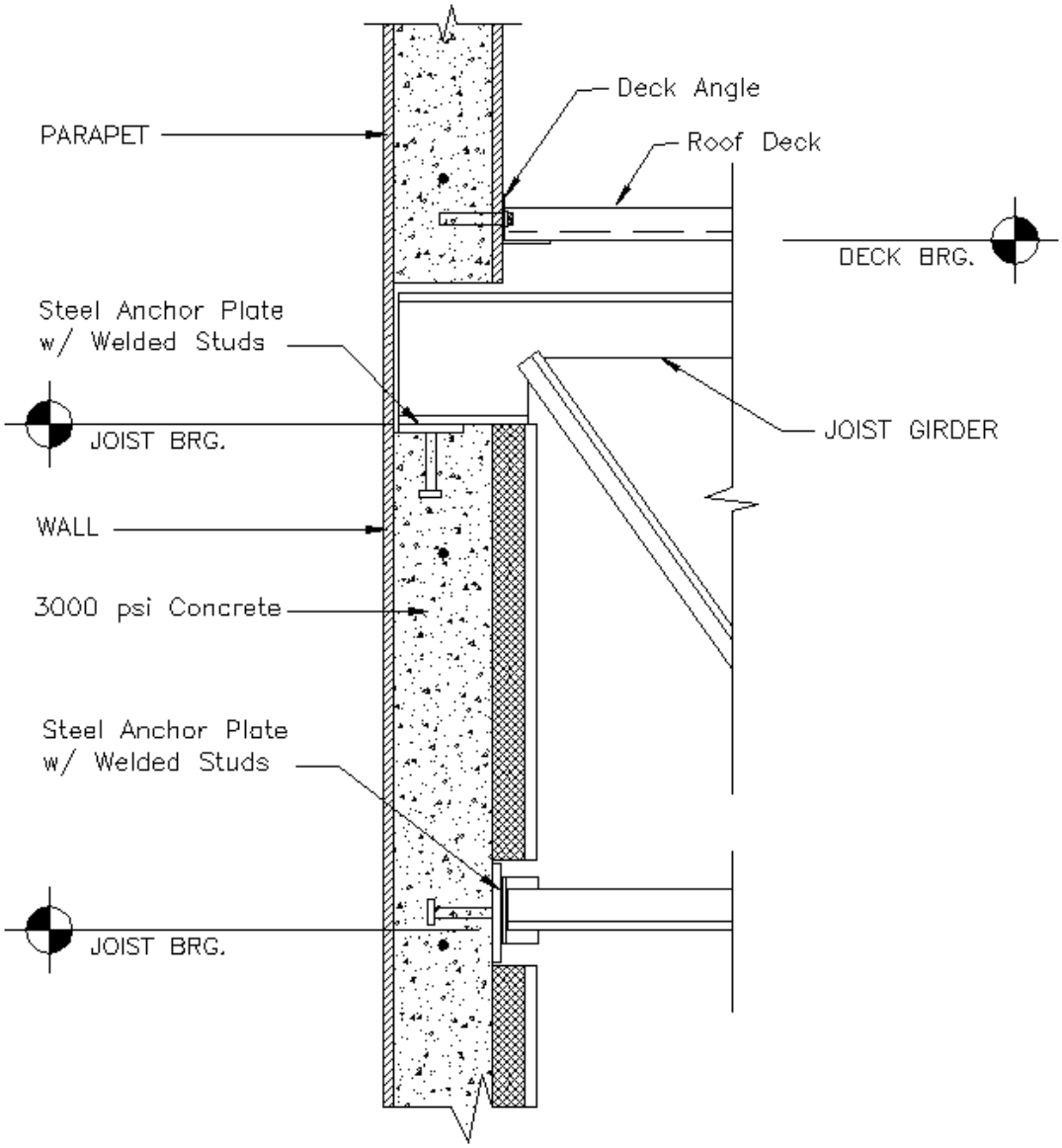
Hollow-core Concrete Plank to Wall connection Detail (typ.)

DETAIL 37



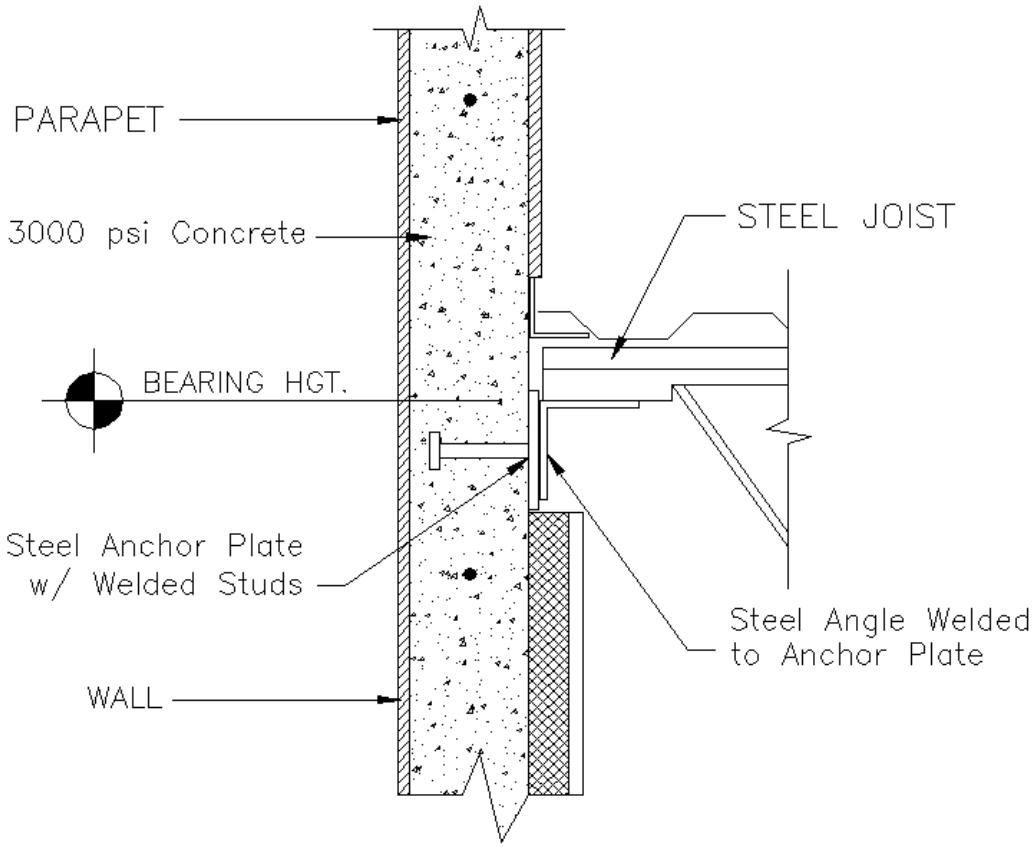
Steel Bar Joist/ Deck Composite Floor System to Wall Connection Detail (typ.)

DETAIL 38



Steel Joist Girder to Wall Connection Detail (typ.)

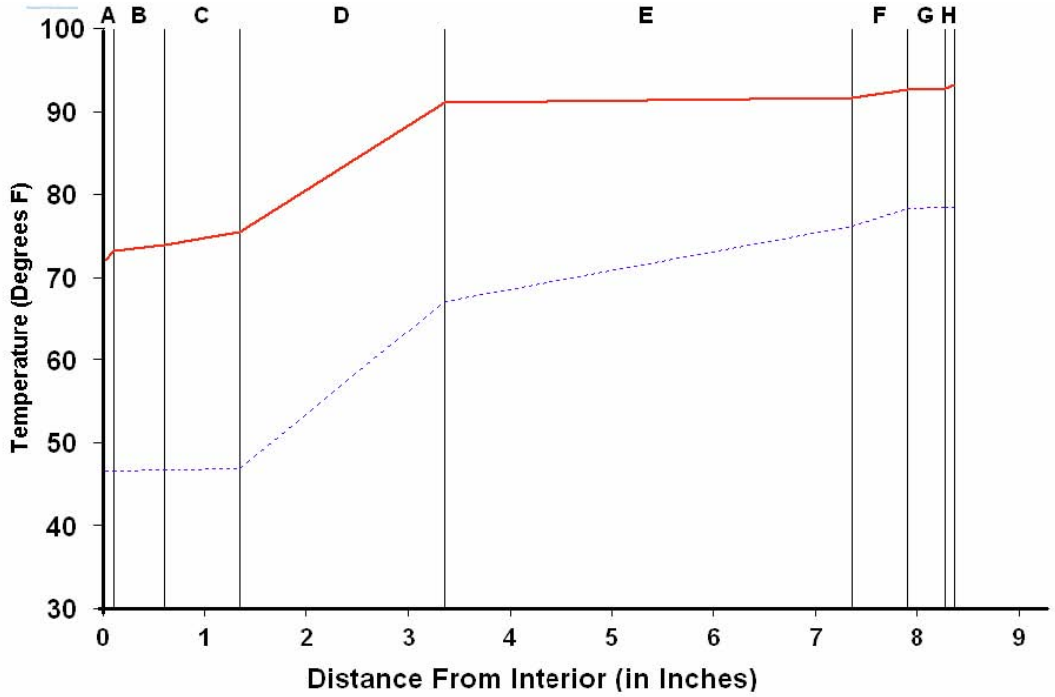
DETAIL 39



Steel Joist to Wall
Connection Detail (typ.)

DEW POINTE ANALYSIS

4" THICK CORE - INSULATED WALL



Legend
Actual Temperature
Dewpoint Temperature

Dewpoint Theory predicts condensation in a system at any point where the actual and dewpoint temperature lines cross.

Conditions:	Interior	Exterior
Temperature	72.0	93
Humidity	40	62.5

	Component Name	Thickness	R-Value	Rep
A	Interior Air Film	0.100	0.68	0.001
B	Drywall .5in	0.500	0.45	0.014
C	Wall Air Space NonRefl	0.750	1.01	0.006
D	STYROFOAM Square Edge	2.000	10.00	1.800
E	Concrete	4.000	0.32	1.240
F	14mm Magnesium board	0.550	0.66	0.350
G	Cementitious coating	0.375	0.08	0.020
H	Out Air Film Summer	0.100	0.25	0.001
I				
J				
K				
L				
	TOTAL	8.375	13.45	3.432

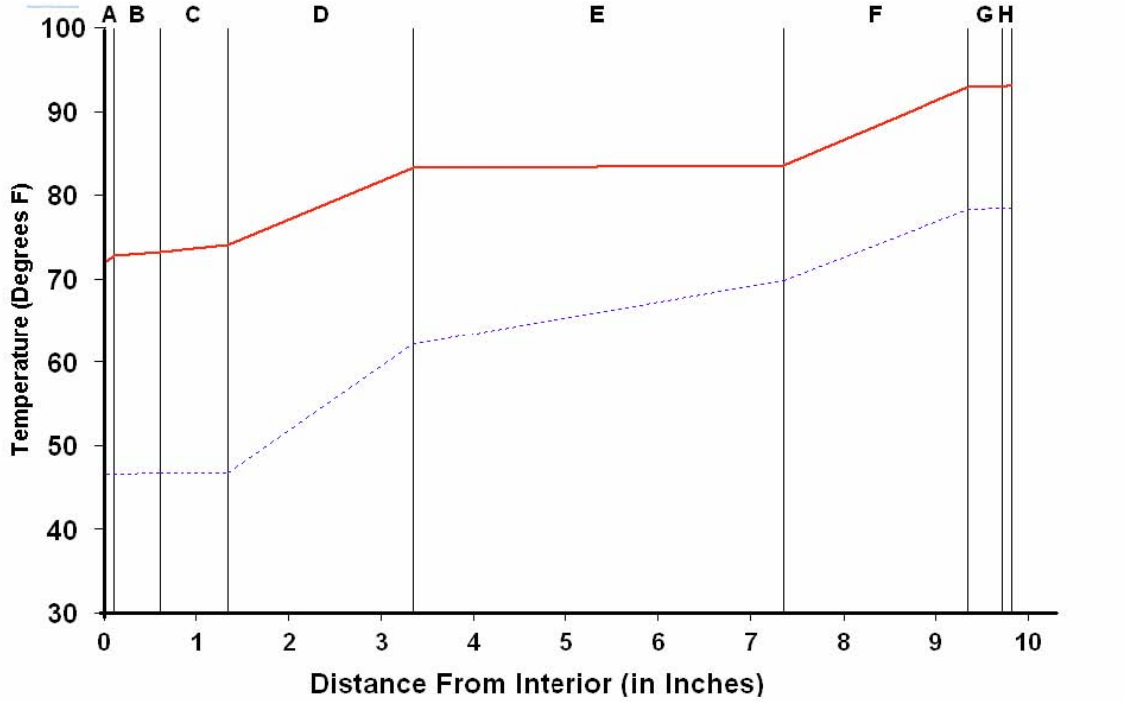
Interface	Temperature Actual	Temperature Dewpnt	Accum (oz/day-sqft)
-A	72.00	46.37	0.000
AB	73.06	46.38	0.000
BC	73.76	46.61	0.000
CD	75.34	46.70	0.000
DE	90.95	66.95	0.000
EF	91.45	76.00	0.000
FG	92.48	78.17	0.000
GH	92.61	78.30	0.000
HI	93.00	78.30	0.000
IJ			
JK			
KL			
L-			

Note:
This calculation is based on the theory of Water Vapor Migration presented in the ASHRAE 1993 Fundamentals Handbook. Actual performance may vary depending upon air infiltration, workmanship, and building materials. This information assumes no obligation or liability for its use (provided by Dow Chemical Company).

APPENDIX A

DEW POINTE ANALYSIS

4" THICK CORE - DOUBLE INSULATED WALL



Legend
Actual Temperature
Dewpoint Temperature

Dewpoint Theory predicts condensation in a system at any point where the acual and dewpoint temperature lines cross.

Conditions:		
	Interior	Exterior
Temperature	72.0	93
Humidity	40.0	62.5

	Component Name	Thickness	R-Value	Rep
A	Interior Air Film	0.100	0.68	0.001
B	Drywall .5in	0.500	0.45	0.014
C	Wall Air Space NonRefl	0.750	1.01	0.006
D	STYROFOAM Square Edge	2.000	10.00	1.800
E	Concrete	4.000	0.32	1.240
F	STYROFOAM Square Edge	2.000	10.00	1.800
G	Cementitious coating	0.375	0.08	0.020
H	Out Air Film Summer	0.100	0.25	0.001
I				
J				
K				
L				
	TOTAL	9.825	22.79	4.882

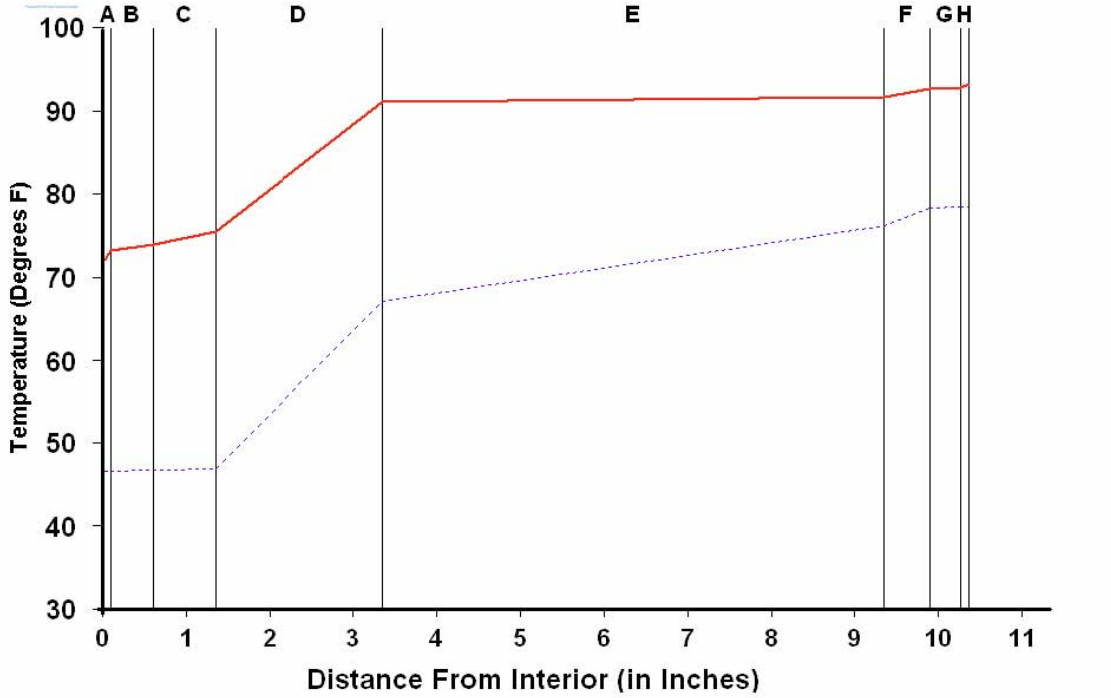
Interface	Temperature Actual	Temperature Dewpnt	Accum (oz/day-sqft)
-A	72.00	46.37	0.000
AB	72.63	46.38	0.000
BC	73.04	46.54	0.000
CD	73.97	46.60	0.000
DE	83.19	62.08	0.000
EF	83.48	69.61	0.000
FG	92.70	78.21	0.000
GH	92.77	78.30	0.000
HI	93.00	78.30	0.000
IJ			
JK			
KL			
L-			

Note:
This calculation is based on the theory of Water Vapor Migration presented in the ASHRAE 1993 Fundamentals Handbook. Actual performance may vary depending upon air infiltration, workmanship, and building materials. This information assumes no obligation or liability for its use (provided by Dow Chemical Company).

APPENDIX A

DEW POINTE ANALYSIS

6" THICK CORE - INSULATED WALL



Legend
Actual Temperature
Dewpoint Temperature

Dewpoint Theory predicts condensation in a system at any point where the actual and dewpoint temperature lines cross.

Conditions:	Interior	Exterior
Temperature	72.0	93
Humidity	40.0	62.5

	Component Name	Thickness	R-Value	Rep
A	Interior Air Film	0.100	0.68	0.001
B	Drywall .5in	0.500	0.45	0.014
C	Wall Air Space NonRefl	0.750	1.01	0.006
D	STYROFOAM Square Edge	2.000	10.00	1.800
E	Concrete	6.000	0.32	1.240
F	14mm Magnesium board	0.550	0.66	0.350
G	Cementitious coating	0.375	0.08	0.020
H	Out Air Film Summer	0.100	0.25	0.001
I				
J				
K				
L				
	TOTAL	10.375	13.45	3.432

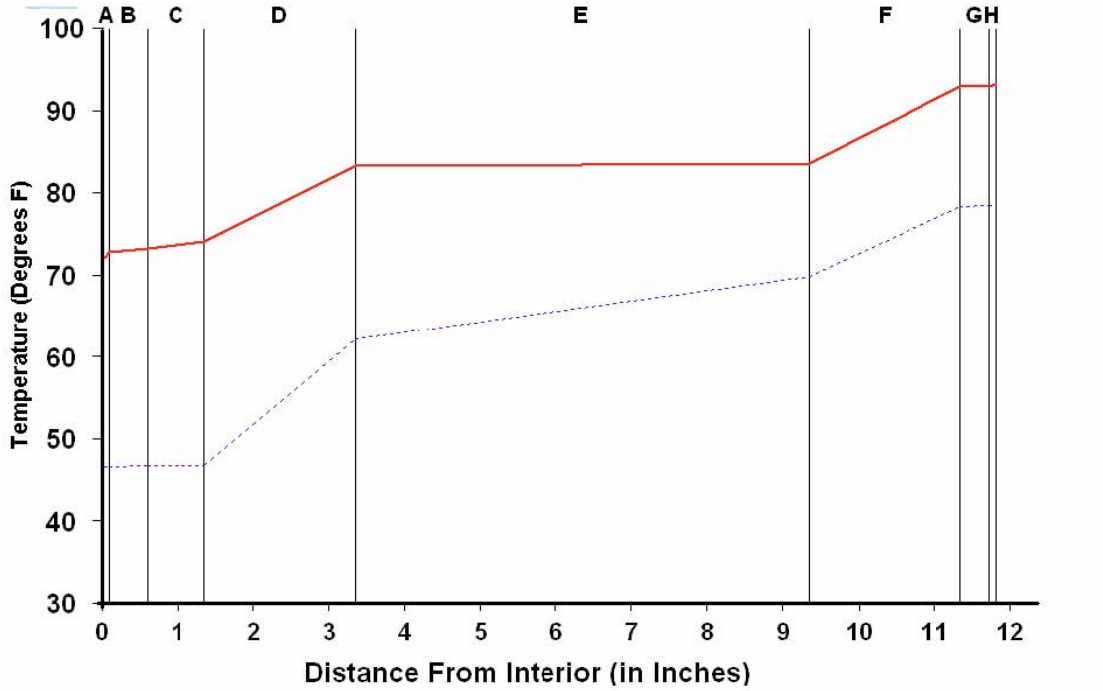
Interface	Temperature Actual	Temperature Dewpnt	Accum (oz/day-sqft)
-A	72.00	46.37	0.000
AB	73.06	46.38	0.000
BC	73.76	46.61	0.000
CD	75.34	46.70	0.000
DE	90.95	66.95	0.000
EF	91.45	76.00	0.000
FG	92.48	78.17	0.000
GH	92.61	78.30	0.000
HI	93.00	78.30	0.000
IJ			
JK			
KL			
L-			

Note:
This calculation is based on the theory of Water Vapor Migration presented in the ASHRAE 1993 Fundamentals Handbook. Actual performance may vary depending upon air infiltration, workmanship, and building materials. This information assumes no obligation or liability for its use (provided by Dow Chemical Company).

APPENDIX A

DEW POINTE ANALYSIS

6" THICK CORE - DOUBLE INSULATED WALL



Legend
Actual Temperature
Dewpoint Temperature

Dewpoint Theory predicts condensation in a system at any point where the actual and dewpoint temperature lines cross.

Conditions:	Interior	Exterior
Temperature	72.0	93
Humidity	40.0	62.5

	Component Name	Thickness	R-Value	Rep
A	Interior Air Film	0.100	0.68	0.001
B	Drywall .5in	0.500	0.45	0.014
C	Wall Air Space NonRefl	0.750	1.01	0.006
D	STYROFOAM Square Edge	2.000	10.00	1.800
E	Concrete	6.000	0.32	1.240
F	STYROFOAM Square Edge	2.000	10.00	1.800
G	Cementitious coating	0.375	0.08	0.020
H	Out Air Film Summer	0.100	0.25	0.001
I				
J				
K				
L				
	TOTAL	11.825	22.79	4.882

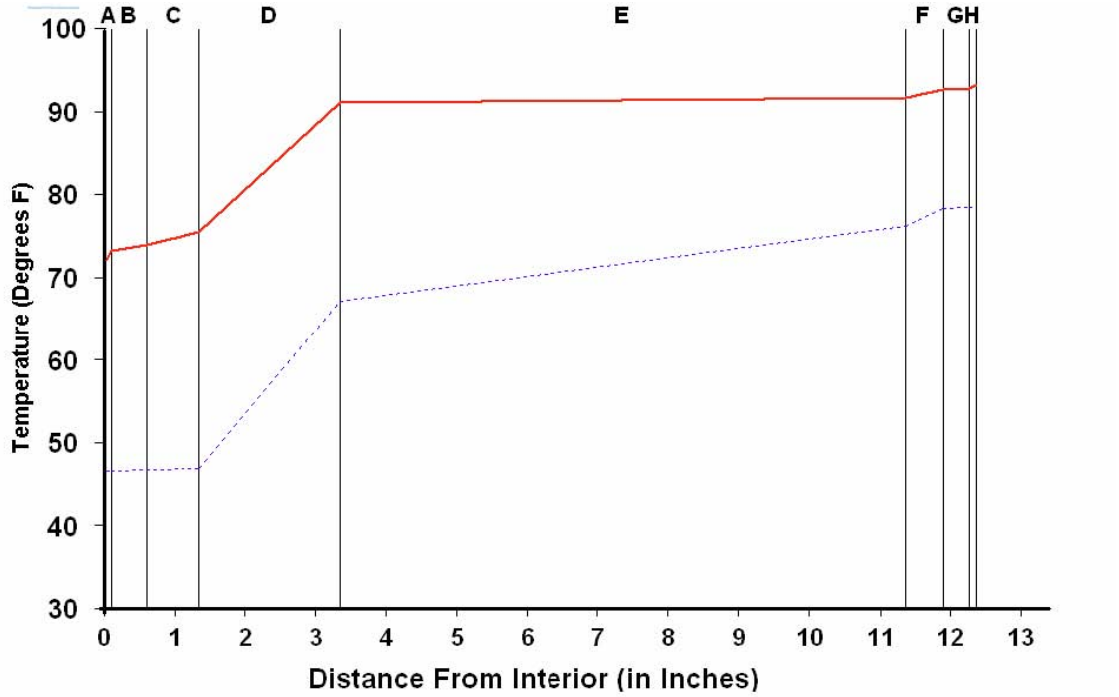
Interface	Temperature Actual	Temperature Dewpnt	Accum (oz/day-sqft)
-A	72.00	46.37	0.000
AB	72.63	46.38	0.000
BC	73.04	46.54	0.000
CD	73.97	46.60	0.000
DE	83.19	62.08	0.000
EF	83.48	69.61	0.000
FG	92.70	78.21	0.000
GH	92.77	78.30	0.000
HI	93.00	78.30	0.000
IJ			
JK			
KL			
L-			

Note:
This calculation is based on the theory of Water Vapor Migration presented in the ASHRAE 1993 Fundamentals Handbook. Actual performance may vary depending upon air infiltration, workmanship, and building materials. This information assumes no obligation or liability for its use (provided by Dow Chemical Company).

APPENDIX A

DEW POINTE ANALYSIS

8" THICK CORE - INSULATED WALL



Legend
Actual Temperature
Dewpoint Temperature

Dewpoint Theory predicts condensation in a system at any point where the actual and dewpoint temperature lines cross.

Conditions:	Interior	Exterior
Temperature	72.0	93
Humidity	40.0	62.5

	Component Name	Thickness	R-Value	Rep
A	Interior Air Film	0.100	0.68	0.001
B	Drywall .5in	0.500	0.45	0.014
C	Wall Air Space NonRefl	0.750	1.01	0.006
D	STYROFOAM Square Edge	2.000	10.00	1.800
E	Concrete	8.000	0.32	1.240
F	14mm Magnesium board	0.550	0.66	0.350
G	Cementitious coating	0.375	0.08	0.020
H	Out Air Film Summer	0.100	0.25	0.001
I				
J				
K				
L				
	TOTAL	12.375	13.45	3.432

Interface	Temperature Actual	Temperature Dewpnt	Accum (oz/day-sqft)
-A	72.00	46.37	0.000
AB	73.06	46.38	0.000
BC	73.76	46.61	0.000
CD	75.34	46.70	0.000
DE	90.95	66.95	0.000
EF	91.45	76.00	0.000
FG	92.48	78.17	0.000
GH	92.61	78.30	0.000
HI	93.00	78.30	0.000
IJ			
JK			
KL			
L-			

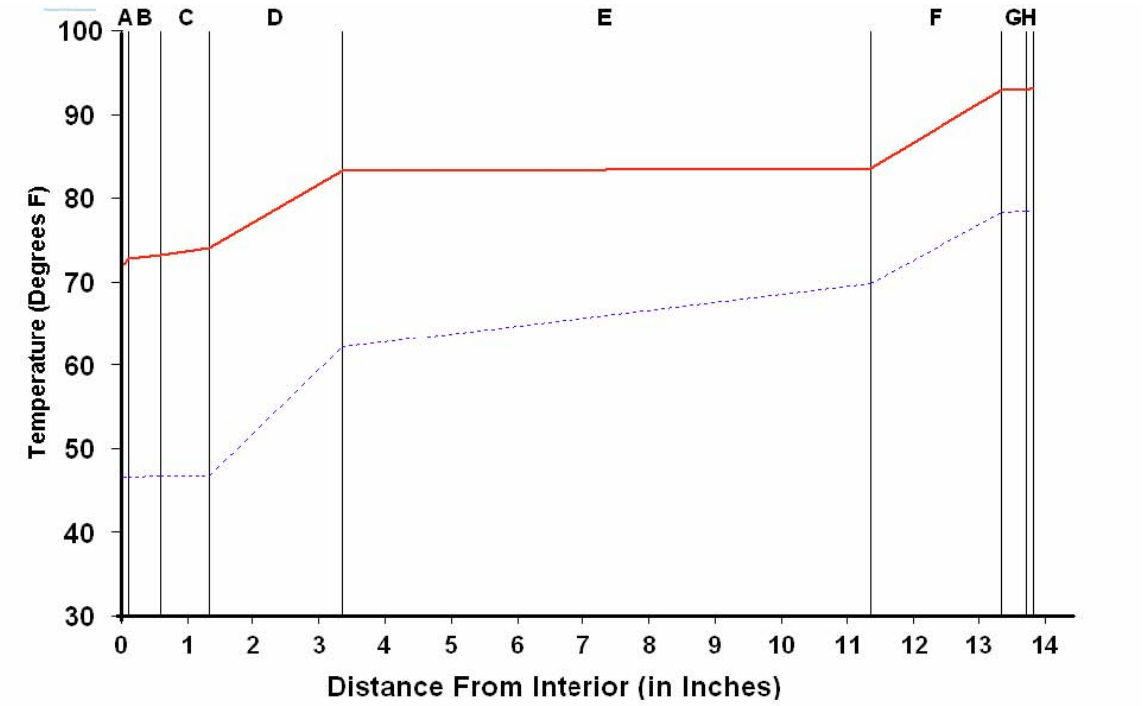
Note:
This calculation is based on the theory of Water Vapor Migration presented in the ASHRAE 1993 Fundamentals Handbook. Actual performance may vary depending upon air infiltration, workmanship, and building materials. This information assumes no obligation or liability for its use (provided by Dow Chemical Company).

APPENDIX A

DEW POINTE ANALYSIS

8" THICK CORE - DOUBLE INSULATED WALL

Note:



Legend
Actual Temperature
Dewpoint Temperature

Dewpoint Theory predicts condensation in a system at any point where the actual and dewpoint temperature lines cross.

Conditions:	Interior	Exterior
Temperature	72.0	93
Humidity	40.0	62.5

	Component Name	Thickness	R-Value	Rep
A	Interior Air Film	0.100	0.68	0.001
B	Drywall .5in	0.500	0.45	0.014
C	Wall Air Space NonRefl	0.750	1.01	0.006
D	STYROFOAM Square Edge	2.000	10.00	1.800
E	Concrete	8.000	0.32	1.240
F	STYROFOAM Square Edge	2.000	10.00	1.800
G	Cementitious coating	0.375	0.08	0.020
H	Out Air Film Summer	0.100	0.25	0.001
I				
J				
K				
L				
	TOTAL	13.825	22.79	4.882

Interface	Temperature Actual	Temperature Dewpnt	Accum (oz/day-sqft)
-A	72.00	46.37	0.000
AB	72.63	46.38	0.000
BC	73.04	46.54	0.000
CD	73.97	46.60	0.000
DE	83.19	62.08	0.000
EF	83.48	69.61	0.000
FG	92.70	78.21	0.000
GH	92.77	78.30	0.000
HI	93.00	78.30	0.000
IJ			
JK			
KL			
L-			

This calculation is based on the theory of Water Vapor Migration presented in the ASHRAE 1993 Fundamentals Handbook. Actual performance may vary depending upon air infiltration, workmanship, and building materials. This information assumes no obligation or liability for its use (provided by Dow Chemical Company).

APPENDIX A