The background of the cover features a blue-toned architectural drawing of a two-story house with a tiled roof, a chimney, and various window styles. A white pen is positioned diagonally across the drawing, pointing towards the bottom left. The title text is overlaid on the right side of the drawing.

# PANHANDLE RESIDENTIAL FOUNDATION MANUAL

Optional foundation systems for use in one and two family dwellings

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It is the intent of this publication to provide several methods to comply with the adopted standards of this municipality as well as provide some additional opportunities to conserve energy and ensure sustainability. “The Guidelines are not intended to be Standards, but are guidelines only, reflecting the engineering opinions and practices of the committee members. They in no way replace the basic need for good engineering judgment based on appropriate education, experience, wisdom, and ethics in any particular engineering application.”

The City of Amarillo, and participating Panhandle Municipalities, here-in provides an approved structural foundation system that complies or exceeds compliance with the Section 403.1 of the 2006 International Residential Code for One and Two Family Dwellings.

The presented systems are provided for optional use in design of residential structures that are considered to comply with City of Amarillo Municipal Code and the 2006 International Residential Code. These approved systems are applicable only for structures that fall within the criteria stipulated by the conditions of the approved foundation systems within the city limits of the City of Amarillo, Texas.

*“The function of a residential foundation is to support the structure. The majority of foundations constructed in Texas consist of shallow, stiffened and reinforced slab-on-ground foundations. Many are placed on expansive clays and/or fills. Foundations placed on expansive clays and/or fills have an increased potential for movement and resulting distress.*

*National building codes have general guidelines, which may not be sufficient for the soil conditions and construction methods in the State of Texas. The purpose of this document is to present recommended practice for the design of residential foundations to augment current building codes to help reduce foundation related problems. Where the recommendations in this document vary from published methods or codes, the differences represent the experience and judgment of the majority of the committee members.*

*On sites having expansive clay, fill, and/or other adverse conditions, residential foundations shall be designed by licensed engineers utilizing the provisions of this document:(Recommended Practice for the Design of Residential Foundations). Expansive clay is defined as soil having a weighted plasticity index greater than 15 as defined by Building Research Advisory Board (BRAB) or a maximum potential volume change greater than 1 percent. This provision should also apply where local geology or experience indicates that active clay soils may be present. We propose that local and state governing bodies adopt this recommended practice.”* Excerpt from: Recommended Practice for the Design of Residential Foundations, Version 1, By the Texas Section American Society of Civil Engineers © 2002

**Table R401.3(a)**

The following Table R401.3(a) depicts the specific approved residential structural foundation systems configurations for specific residential criteria:

Area of Residence (square footage)	Number of Stories	Minimum Width of Perimeter Grade Beam	Size & # of Continuous Reinforcement (Top& Bottom) <sup>a b</sup>	Width/Depth of Interior Grade Beam	Interior Beam Size & # of Continuous Reinforcement
Up to 2400SF	1	10	2-#4	8/8	2-#4
	2	12	2-#5 or 3-#4	8/8	2-#5 or 3-#4
	3	12	2-#5 or 3-#4	12/12	2-#5 or 3-#4
2400-4800SF	1	10	2-#5 or	8/8	2-#5
		10	3-#4	10/16	2-#4
	2	12	2-#5 or 3-#4	12/12	2-#5 or 3-#4
			or 2-#5	12/10	3-#5
3	12	2-#5	12/14	3-#5	
Over 4800SF <sup>c</sup>	<i>Residential Design Professional Required<sup>d</sup></i>				

<sup>a</sup> Reinforcement required top and bottom of footing in accordance with ACI-318

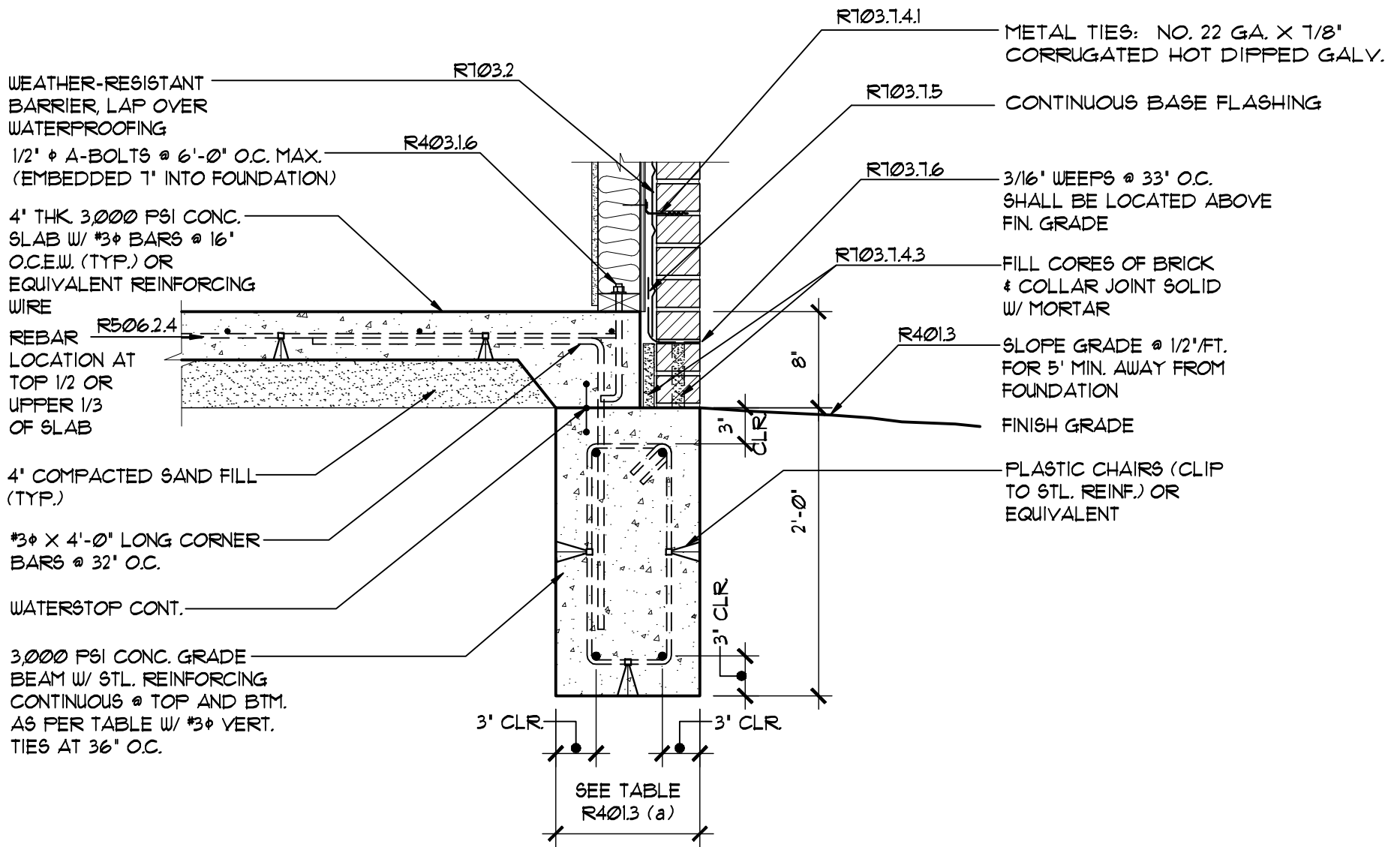
<sup>b</sup> At intersections and corners, the #5 reinforcing bars can be tied using two bundled #4 "L" bars with minimum leg length of 5'.

<sup>c</sup> Consisting of Over 4800 square feet. --- Designed by a Residential Design Professional approved by the City of Amarillo Building Official

<sup>d</sup> Design Professional's are required to be licensed as an Architect or Engineer in the State of Texas in accordance with applicable laws. Residential Structures

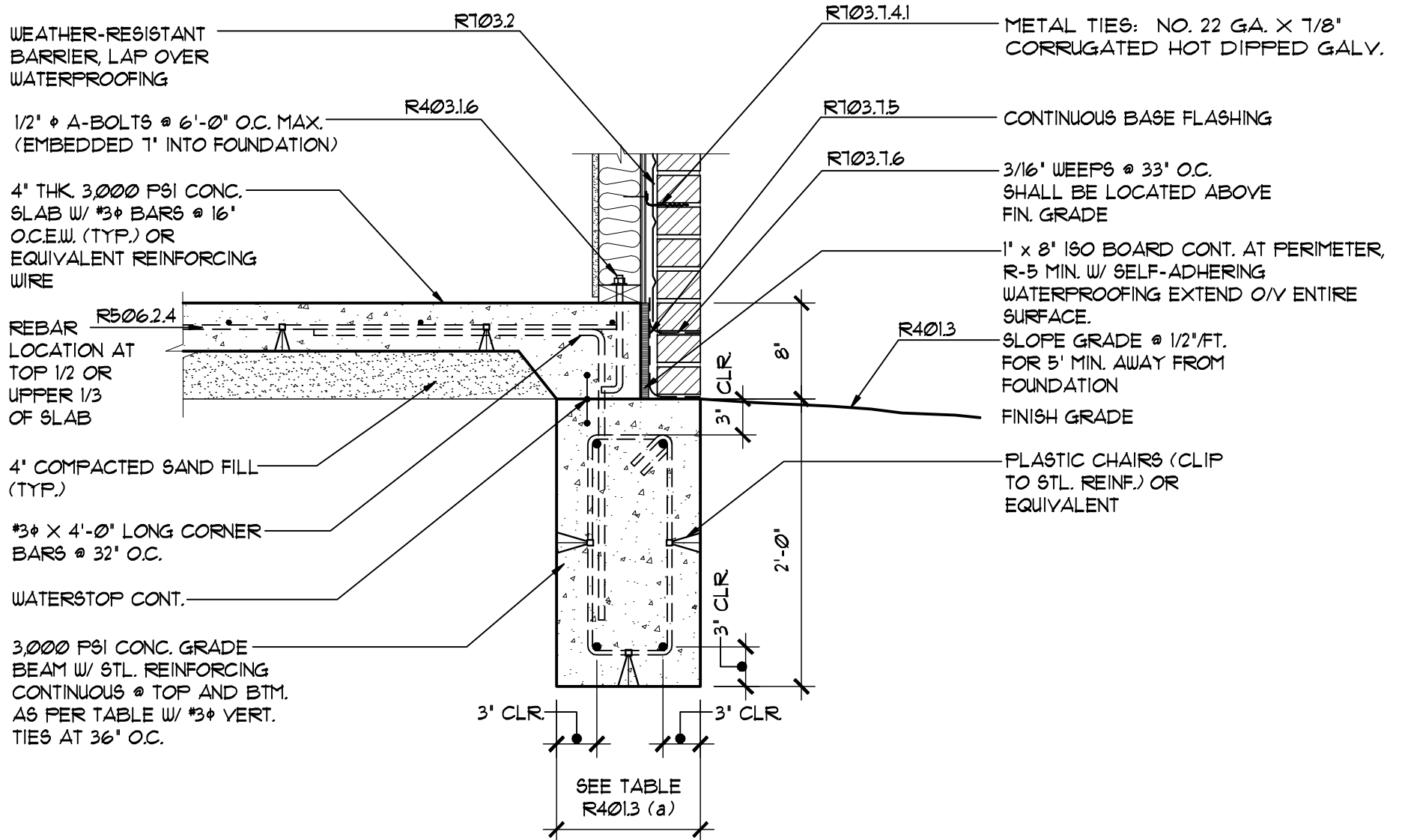
**The Table R403.1(a) is based on the following assumptions and are considered mandatory criteria if application of these approved design standards are utilized:**

1. The generic configurations shown in this table are based on procedures recognized by the Reference (4) Wire Reinforcement Institute's (WRI) *Design of Slab-on-Ground Foundations WRI/CRSI-81*.
2. The effective Plasticity Index (PI) of the sub-grade/fill is less than or equal to 20 when computed by the methods presented by the WRI. The determination of satisfaction this criteria shall be provided by the Building Official. The supporting foundation soils are assumed to have a minimum allowable soil bearing capacity of 1500 psf.
3. The top 8" of subgrade or finished fill soil are processed as specified minimum 90% compaction plus or minus 5% moisture content based on the Standard Proctor (ASTM D-698). Comment - The City of Amarillo does not require, but recommends a minimum of 95% compaction plus or minus 3% based on the Standard Proctor (ASTM D-698).
4. Uniform Loads are distributed across the interior floor slabs at 200 psf for single story, 275 psf for two story, and 350 psf for three story residential structures. Variations in above stated loadings should be taken into consideration in the final individual configuration. Structural demands imposed by concentrated application of loadings should receive enhanced foundation support.
5. All reinforcing steel is Grade 60 (60,000 psi), and all concrete is 3000 psi @ 28 day's cure. All reinforcement must have at least 3" of cover where exposed directly to soil.
6. The approved foundation design standards are considered minimum standards for the *City of Amarillo*. Selected design dimensions and reinforcement sizes that exceed these provided standards can generally be considered acceptable.



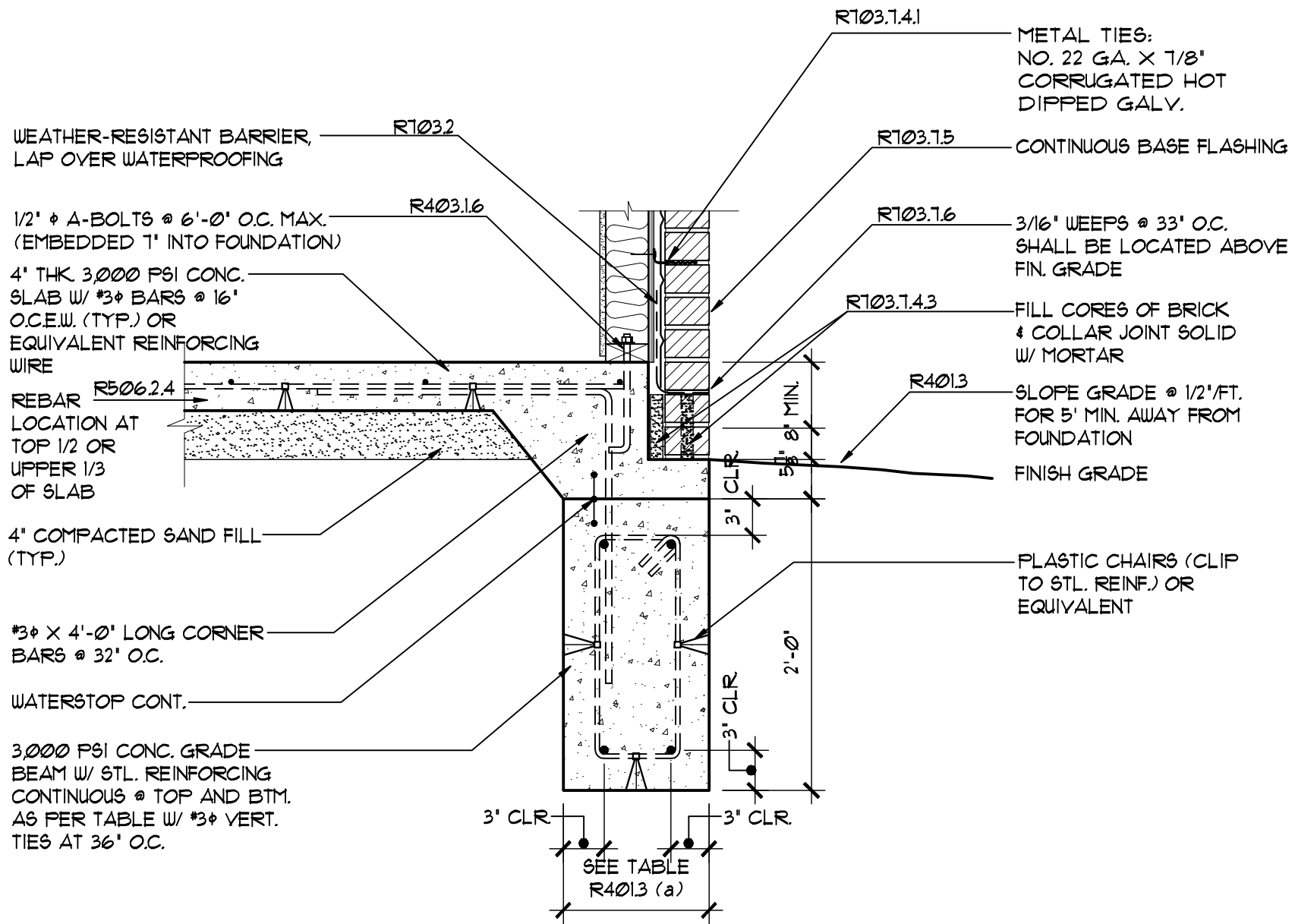
## 2 POUR SLAB ON GRADE FOOTING

SCALE: 1" = 1'-0"



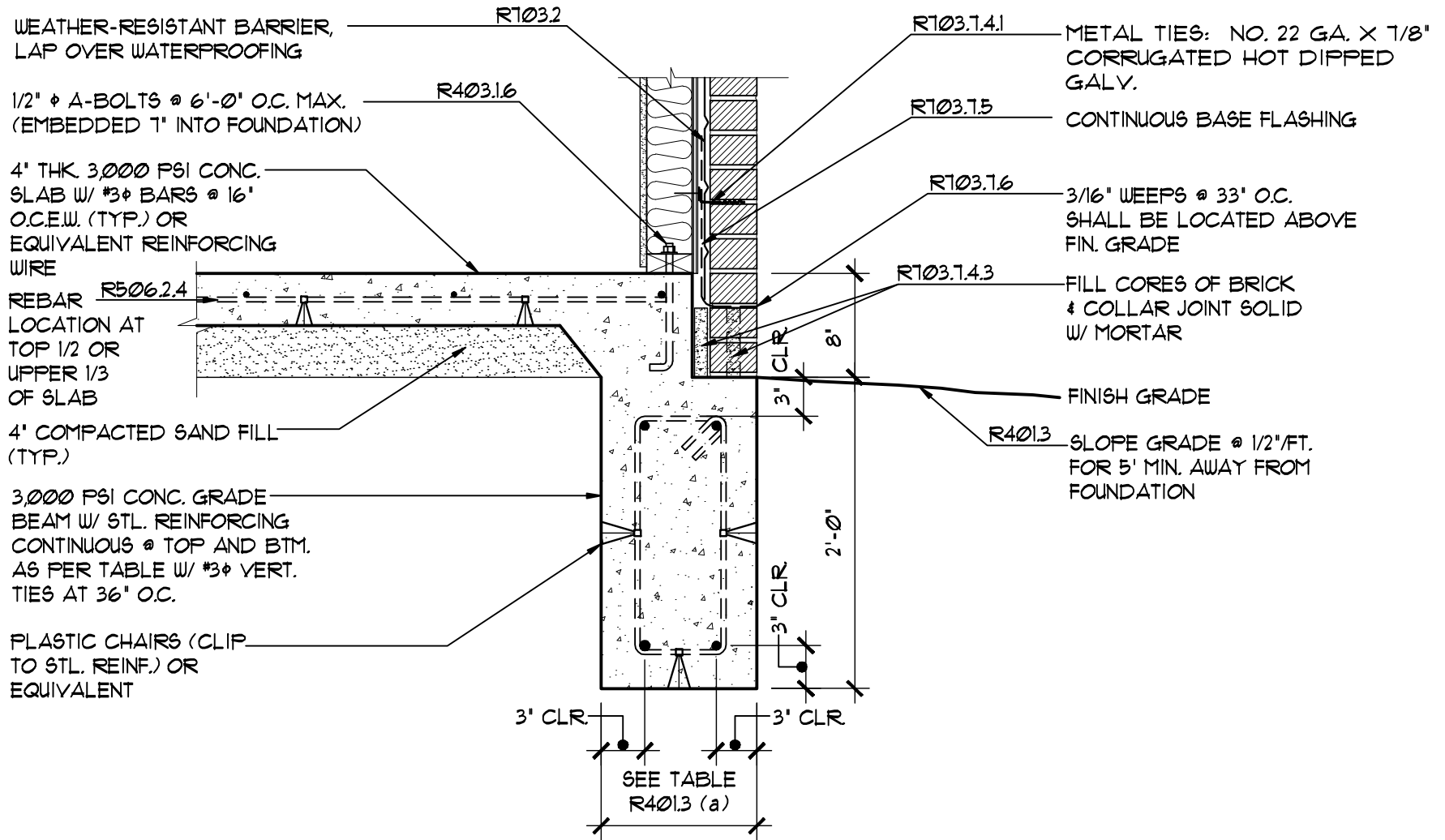
## 2 POUR SLAB ON GRADE FOOTING

SCALE: 1" = 1'-0"



## 2 POUR SLAB ON GRADE FOOTING FLOATING EDGE FORM

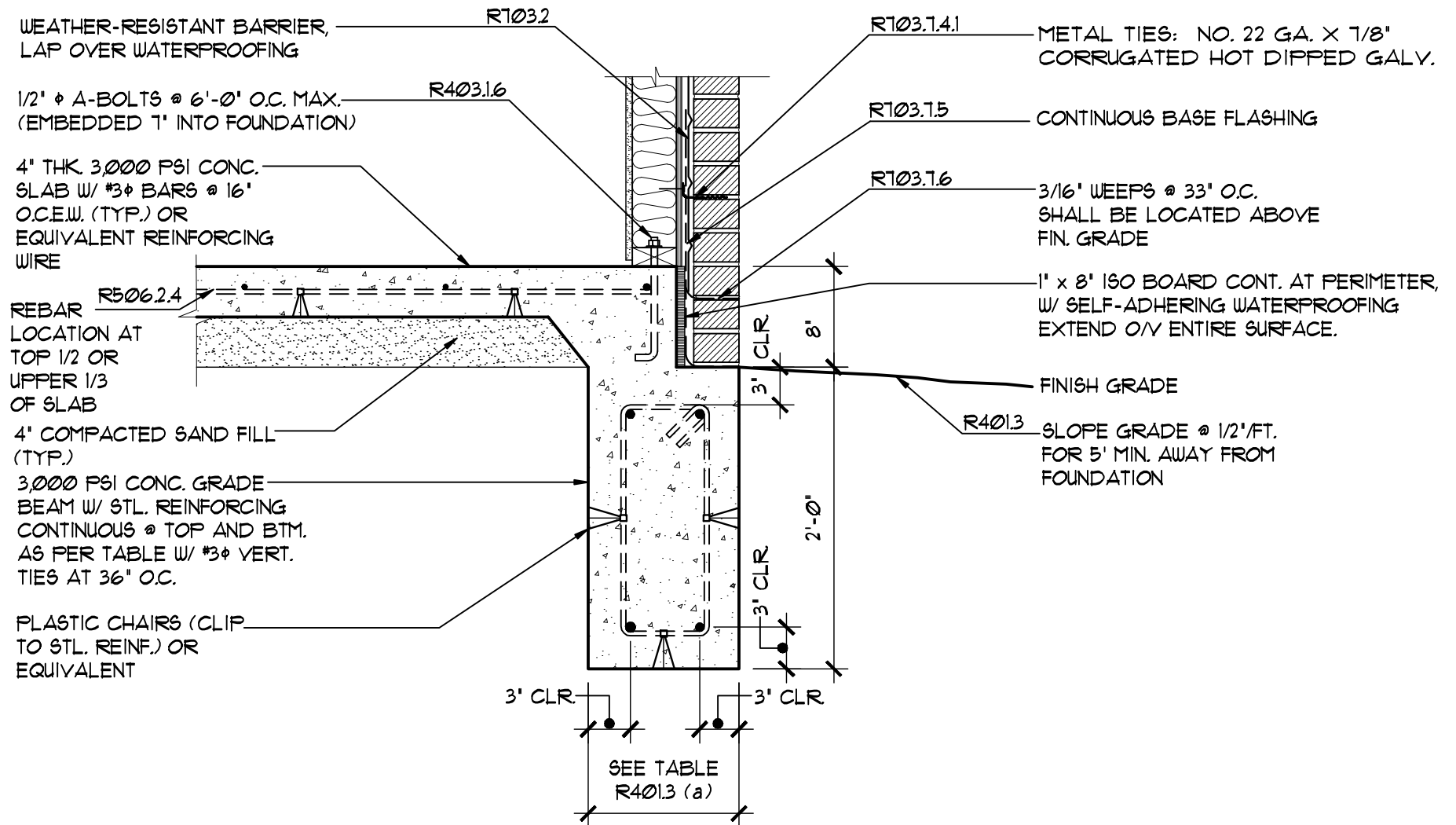
SCALE: 1" = 1'-0"



# MONOLITHIC SLAB ON GRADE FOOTING

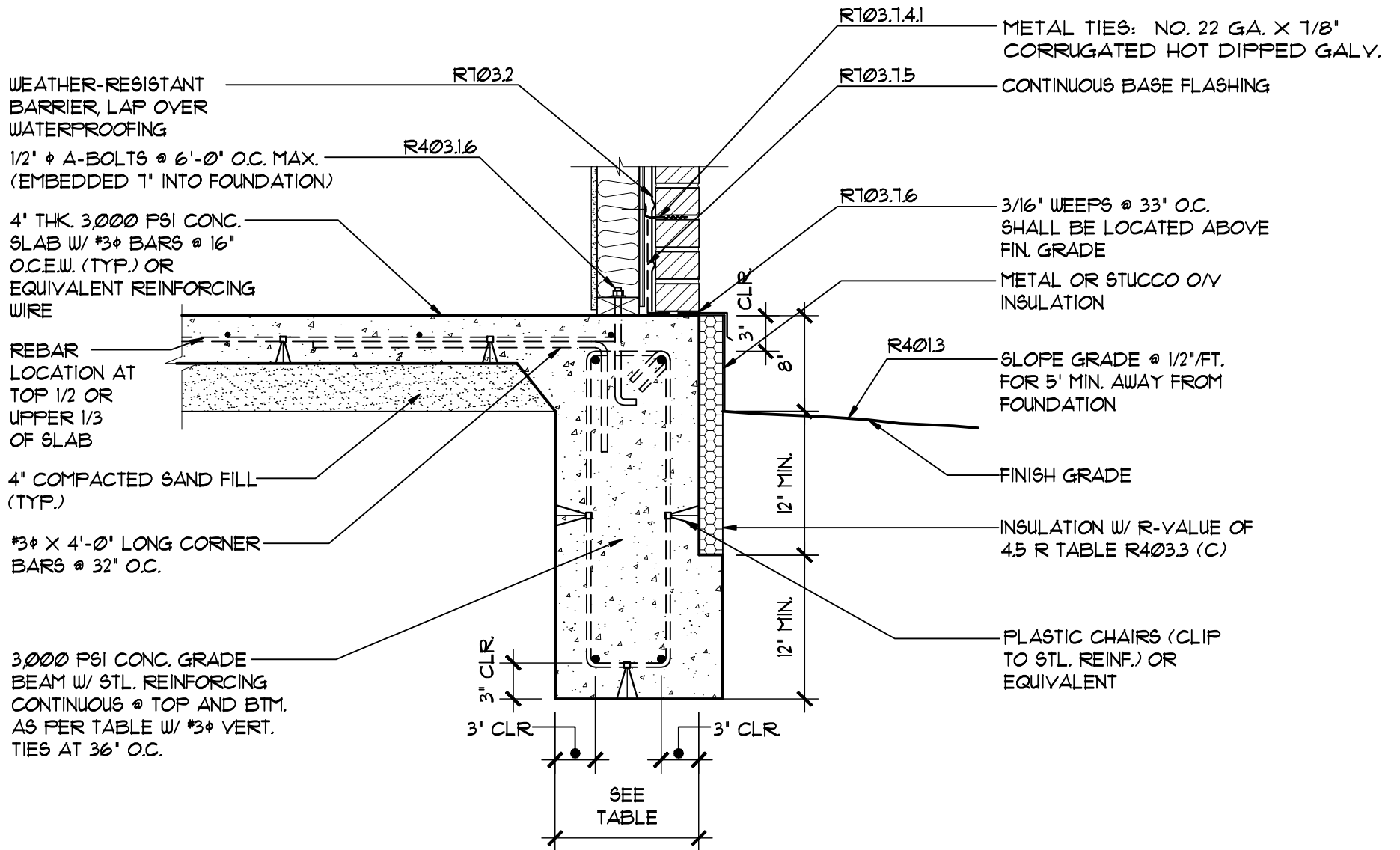
SCALE: 1" = 1'-0"





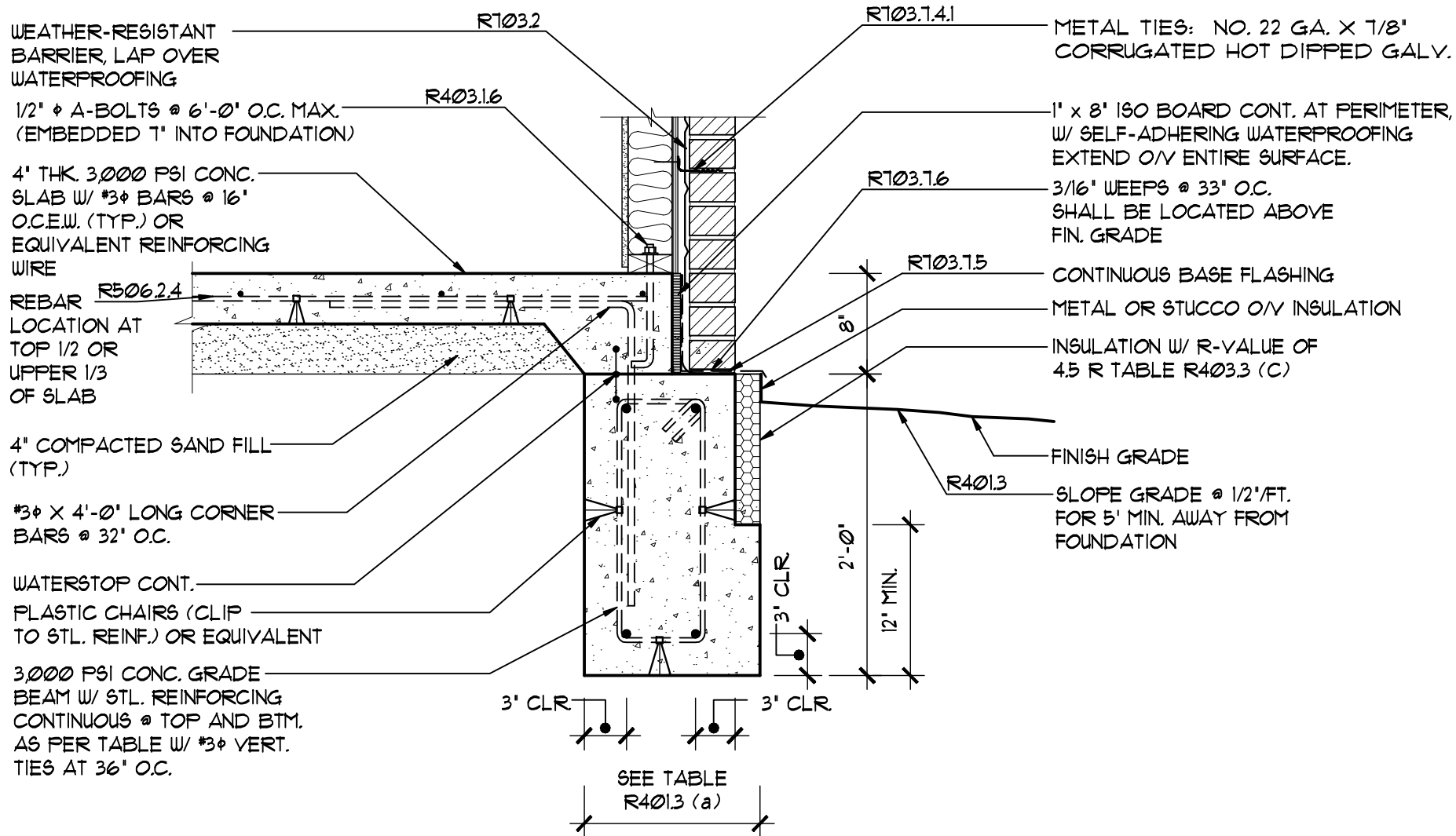
# MONOLITHIC SLAB ON GRADE FOOTING

SCALE: 1" = 1'-0"



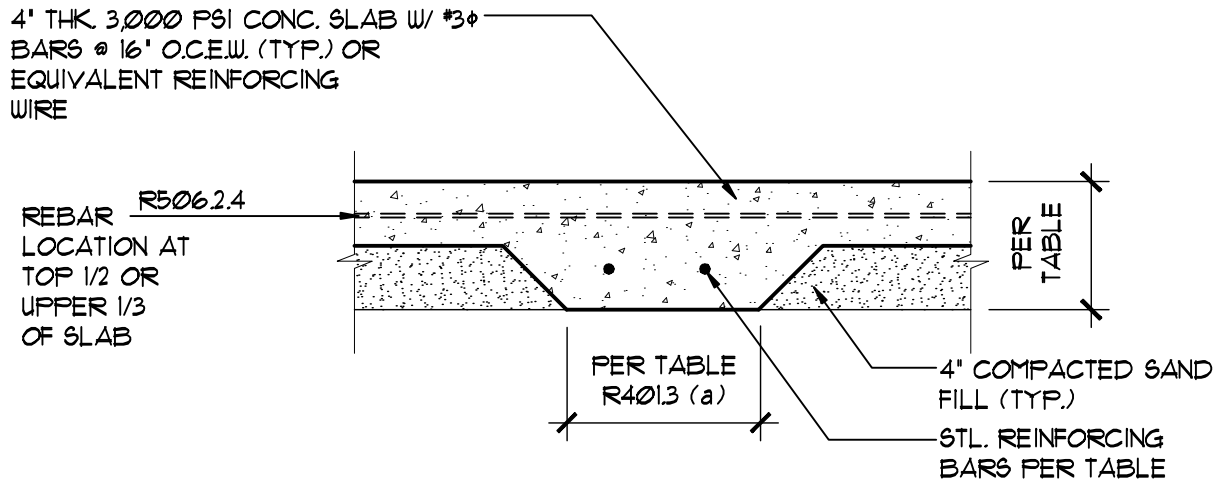
# ENERGY EFFICIENT FOUNDATION, MONOLITHIC

SCALE: 1" = 1'-0"



# ENERGY EFFICIENT FOUNDATION, TWO POUR

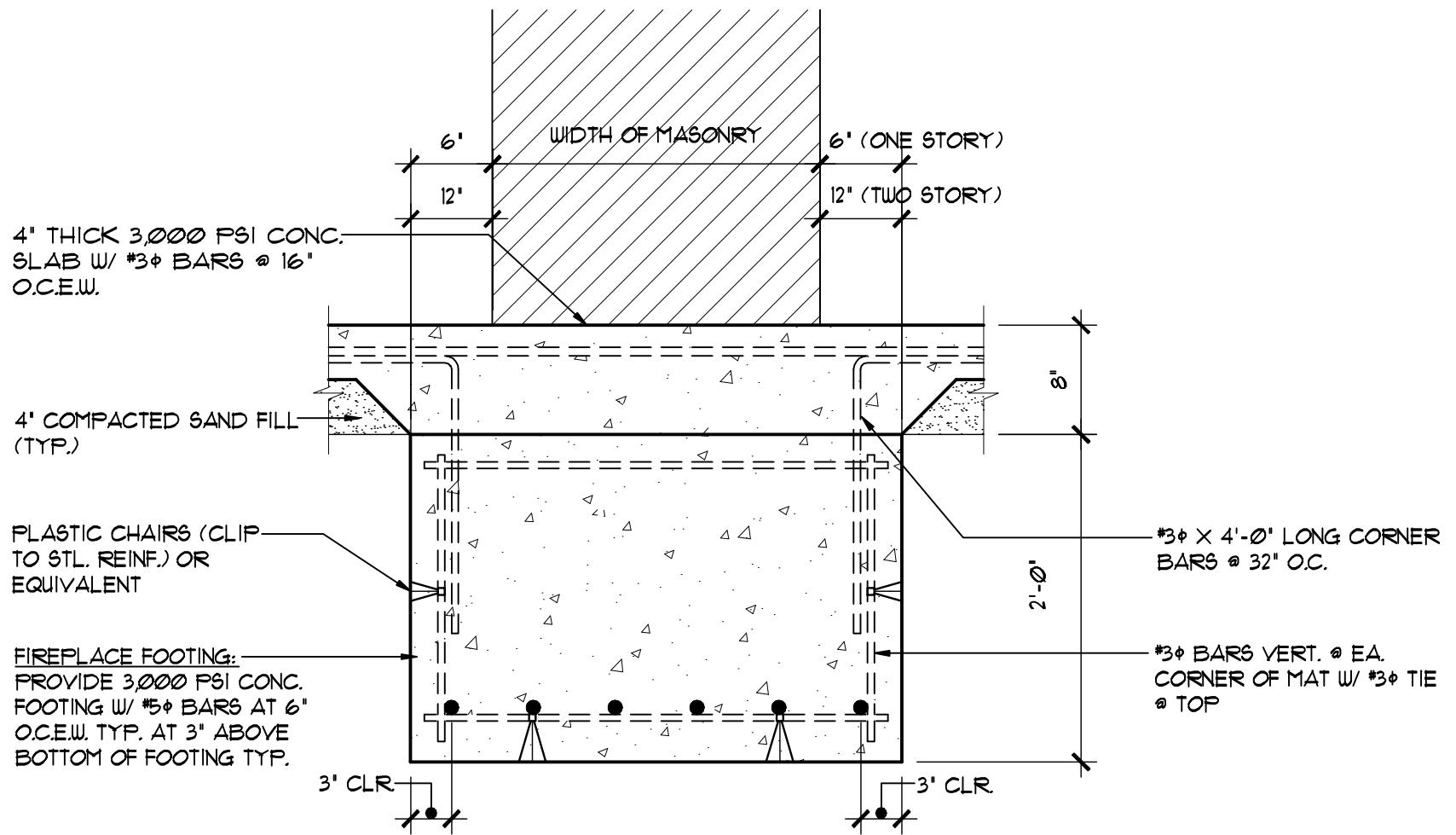
SCALE: 1" = 1'-0"



## INTERIOR FOUNDATION BEAM

SCALE: 1" = 1'-0"

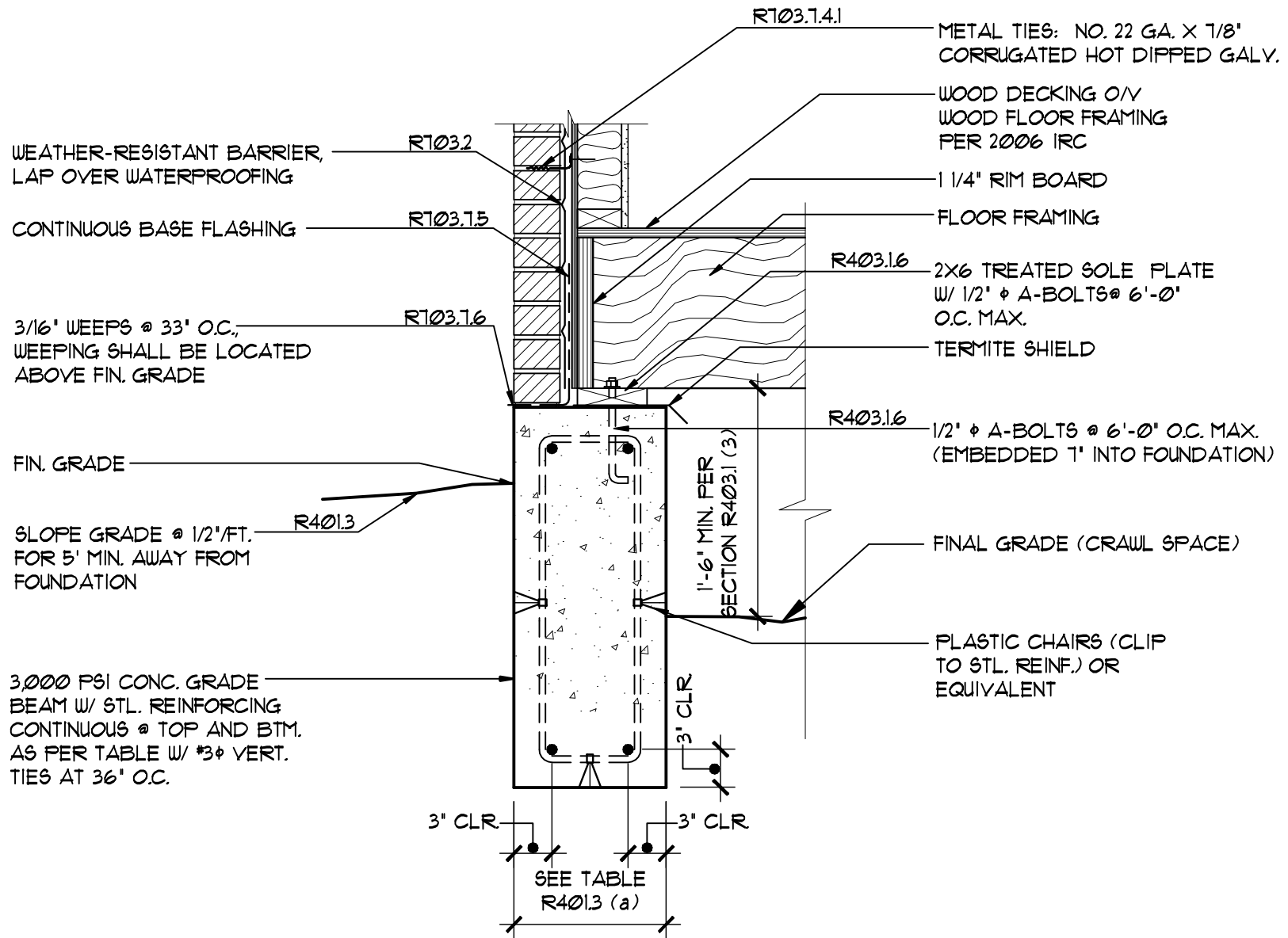
MUST BE INSTALLED AT MAXIMUM  
INTERVALS OF 20' AND/OR UNDER  
LOAD-BEARING WALLS



## FIREPLACE FOOTING

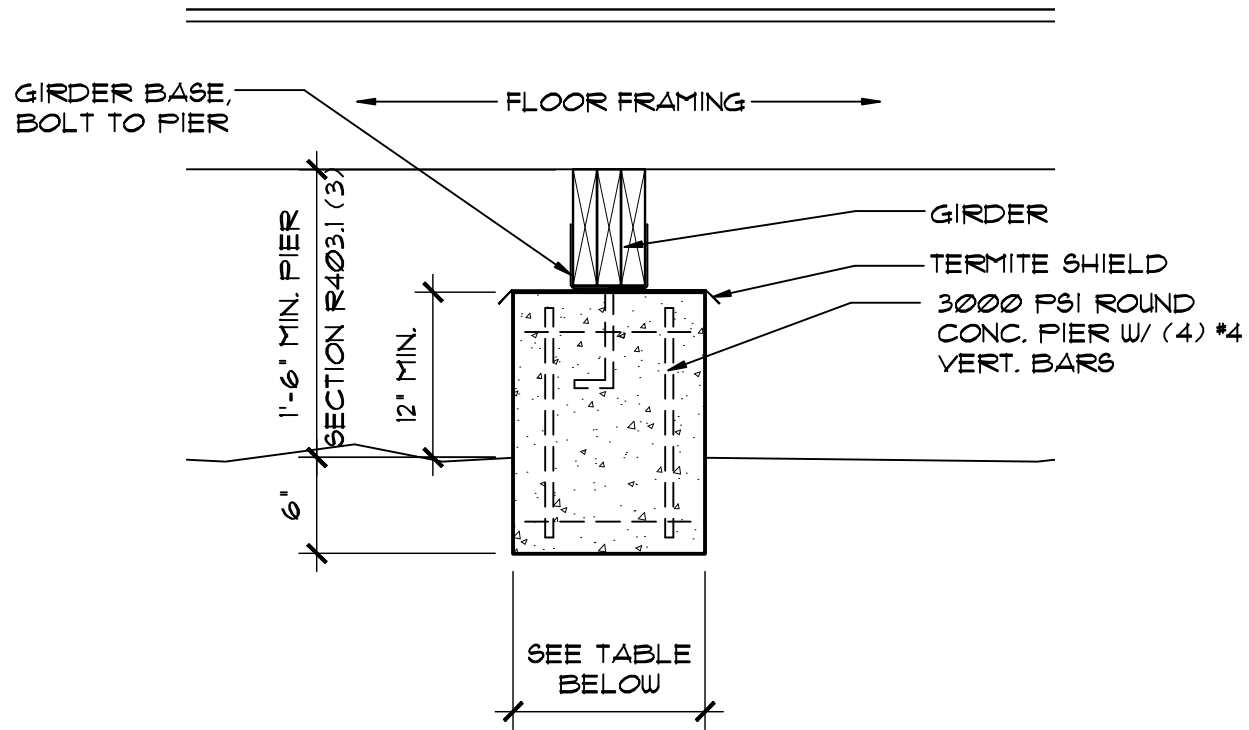
SCALE: 1" = 1'-0"

NOTE: INTERIOR FIREPLACE SHALL BE PERMITTED TO HAVE 12" DEPTH FOOTING



## EXTERIOR FOUNDATION (CONC. PIER AND BEAM SYSTEM)

SCALE: 1" = 1'-0"



### PIER DETAIL (INTERIOR PIER)

SCALE: 1" = 1'-0"

PIER DIA.	SPACING
12"	PIERS SHALL BE LOCATED @ 4'-0" O.C. IN EACH DIRECTION
15"	PIERS SHALL BE LOCATED @ 5'-0" O.C. IN EACH DIRECTION

CLEAR SPAN OF ROOF SLAB	SLAB THICKNESS	REQUIRED REINFORCEMENT	
		SHORT WAY	LONG WAY
6'-0"	5"	1/2" @ 6" O.C.	3/8" @ 10" O.C.
8'-0"	5"	1/2" @ 6" O.C.	3/8" @ 10" O.C.
10'-0"	5"	1/2" @ 6" O.C.	3/8" @ 10" O.C.
12'-0"	6"	1/2" @ 8" O.C.	1/2" @ 16" O.C.
14'-0"	7"	1/2" @ 6" O.C.	1/2" @ 12" O.C.
16'-0"	8"	1/2" @ 6" O.C.	1/2" @ 12" O.C.
18'-0"	9"	1/2" @ 8" O.C.	1/2" @ 10" O.C.
20'-0"	10"	1/2" @ 6" O.C.	1/2" @ 10" O.C.
22'-0"	11"	1/2" @ 6" O.C.	5/8" @ 12" O.C.
24'-0"	12"	1/2" @ 5" O.C.	5/8" @ 12" O.C.

## GENERAL NOTES

GRADE 60 REINFORCING STEEL. BOTTOM BARS TO RUN SHORT WAY WITH 3/4" CLEAR BELOW BARS IN ALL CASES.

3000 PSI MIN. CONCRETE STRENGTH REQUIRED.

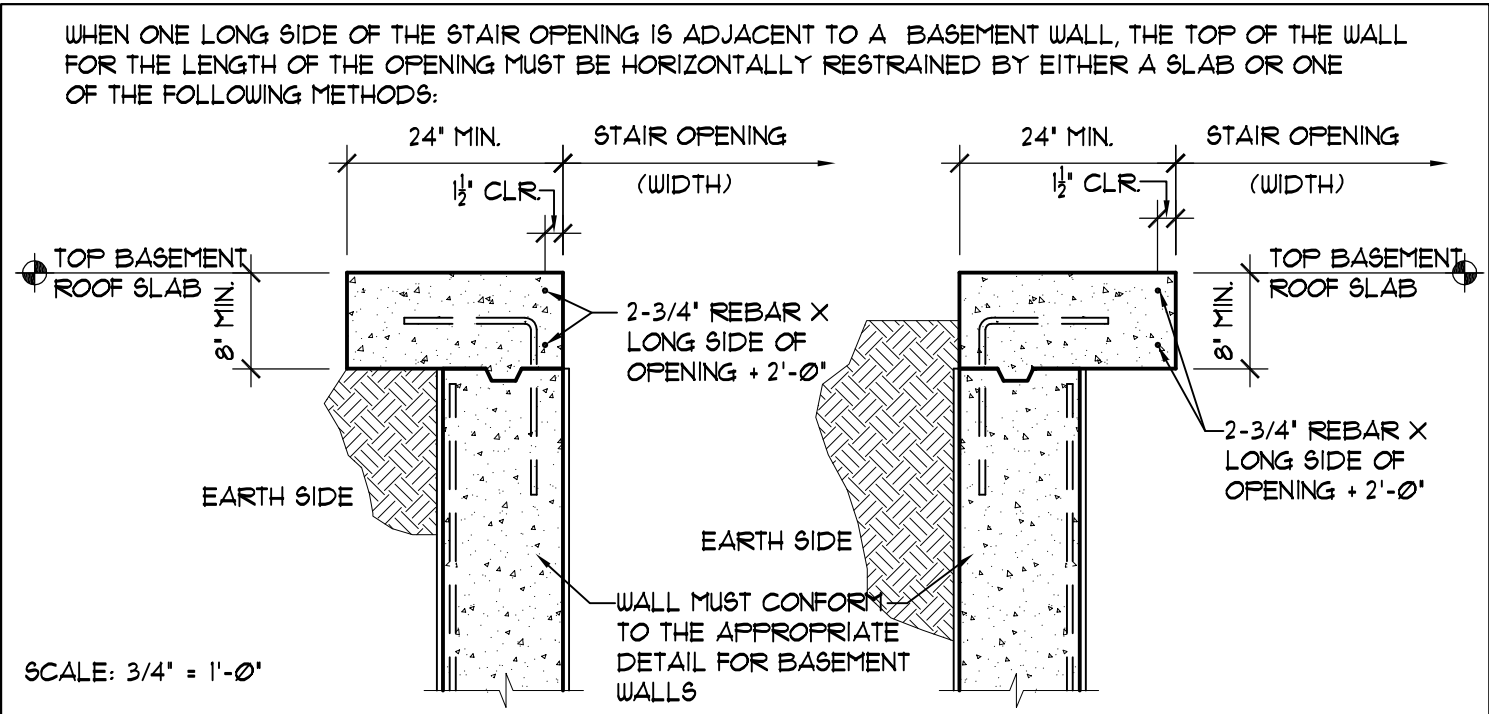
DESIGN LOADS ASSUMED: 100 PSF LIVE LOAD AND 20 PSF PARTITION LOAD.

DESIGN PER ACI 318-83

NO BEARING WALLS SHALL OCCUR ON BASEMENT ROOF SLAB.

BASEMENT MAY NOT BE USED AS SLEEPING AREAS UNLESS EMERGENCY ESCAPE OPENINGS ARE PROVIDED ACCORDING TO IRC SECTION 310.

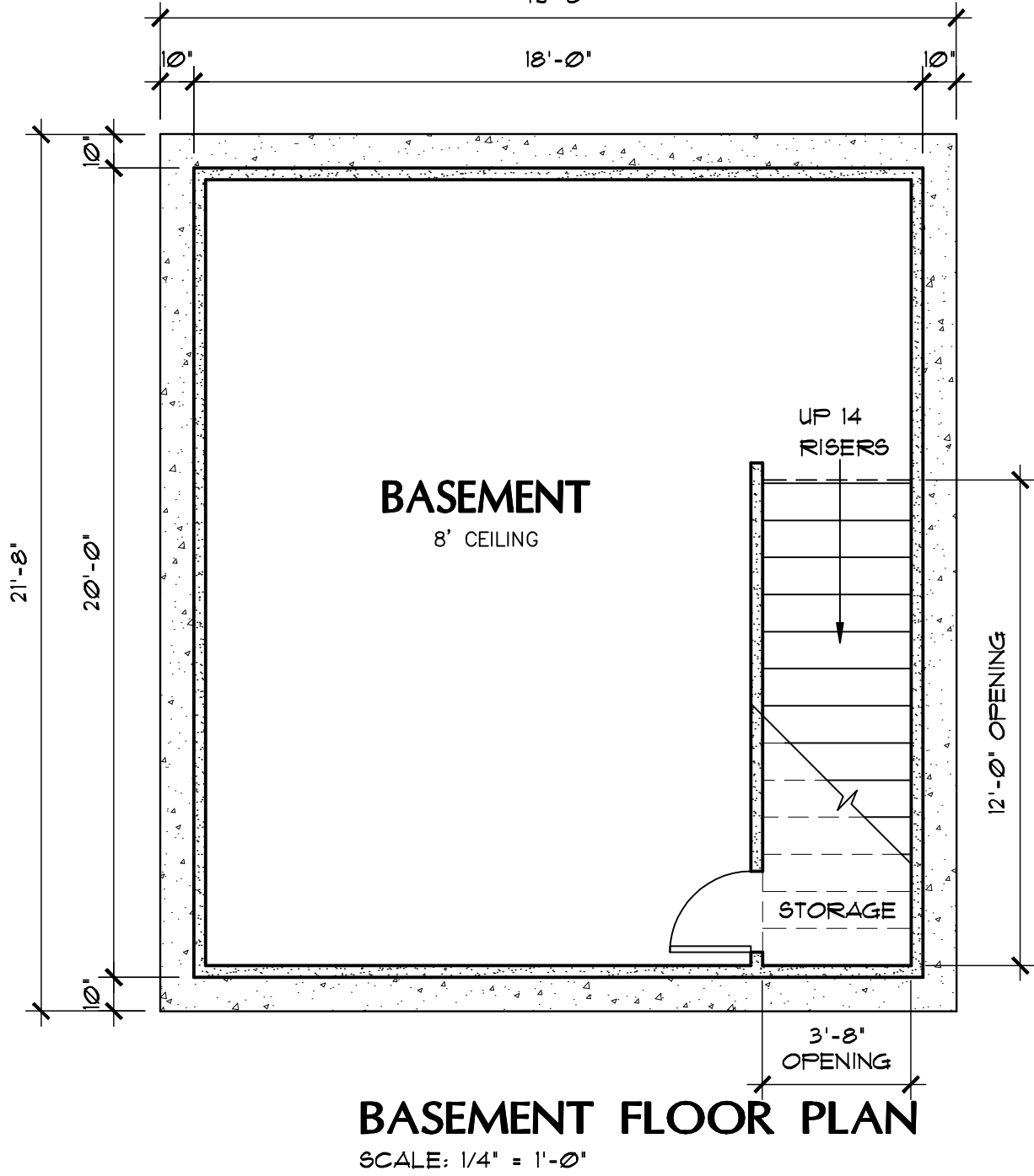
MAXIMUM LENGTH OF STAIR OPENING IN ROOF SLAB SHALL BE 13'-0". OPENINGS SHALL HAVE STEEL SUPPORT BEAM (W12X26, W10X30, OR W8X40) ON ALL SIDES WHERE NO BEARING WALL OCCURS: OPENINGS SHALL HAVE A 3" STANDARD PIPE COLUMN WITH CONCRETE FOOTINGS AT ALL STEEL BEAM INTERSECTIONS.



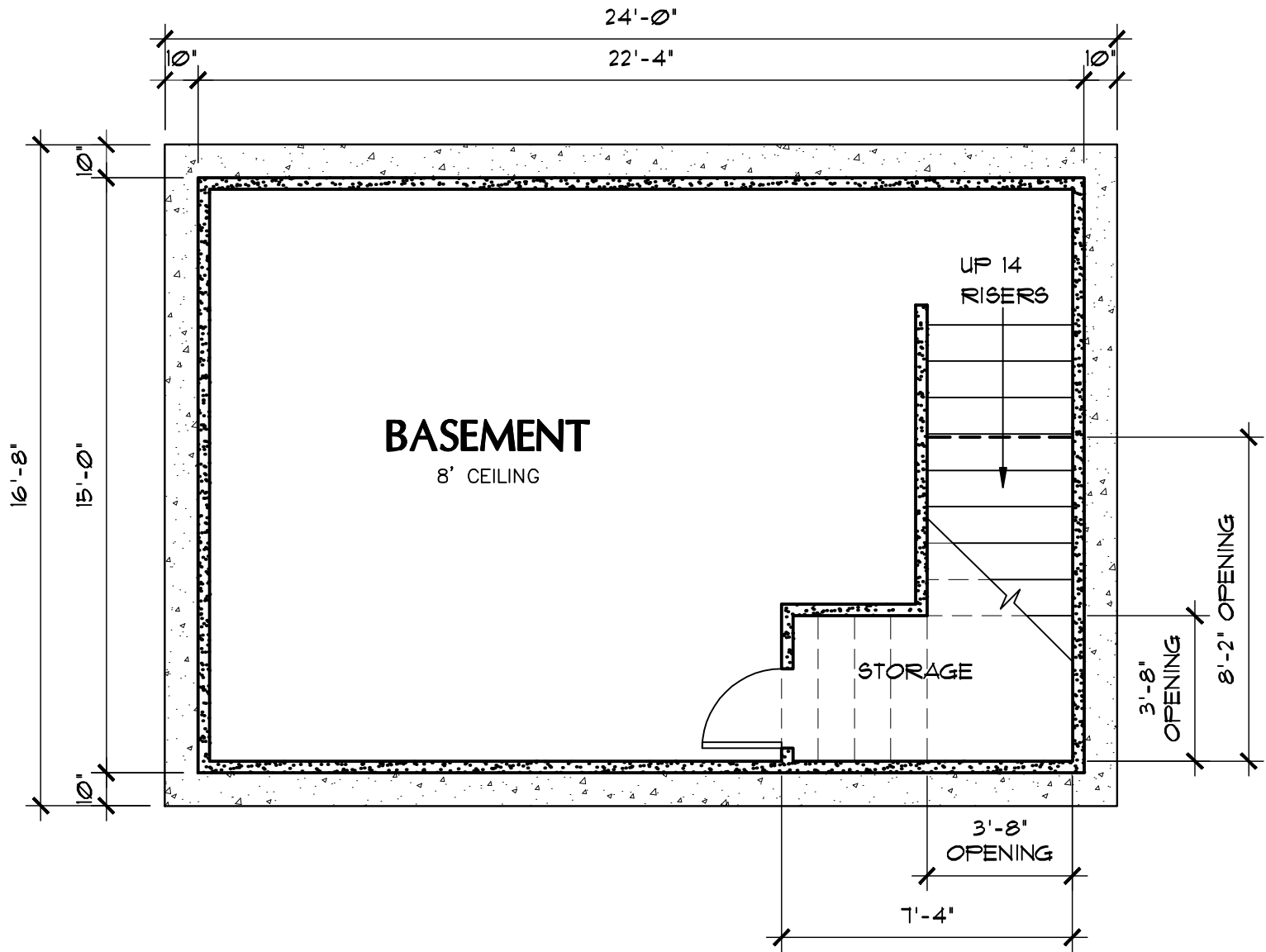
# STANDARD RESIDENTIAL CONCRETE ROOF SLAB DETAIL

(OVER BASEMENT OR STORM CELLAR WITHOUT EARTH COVER)

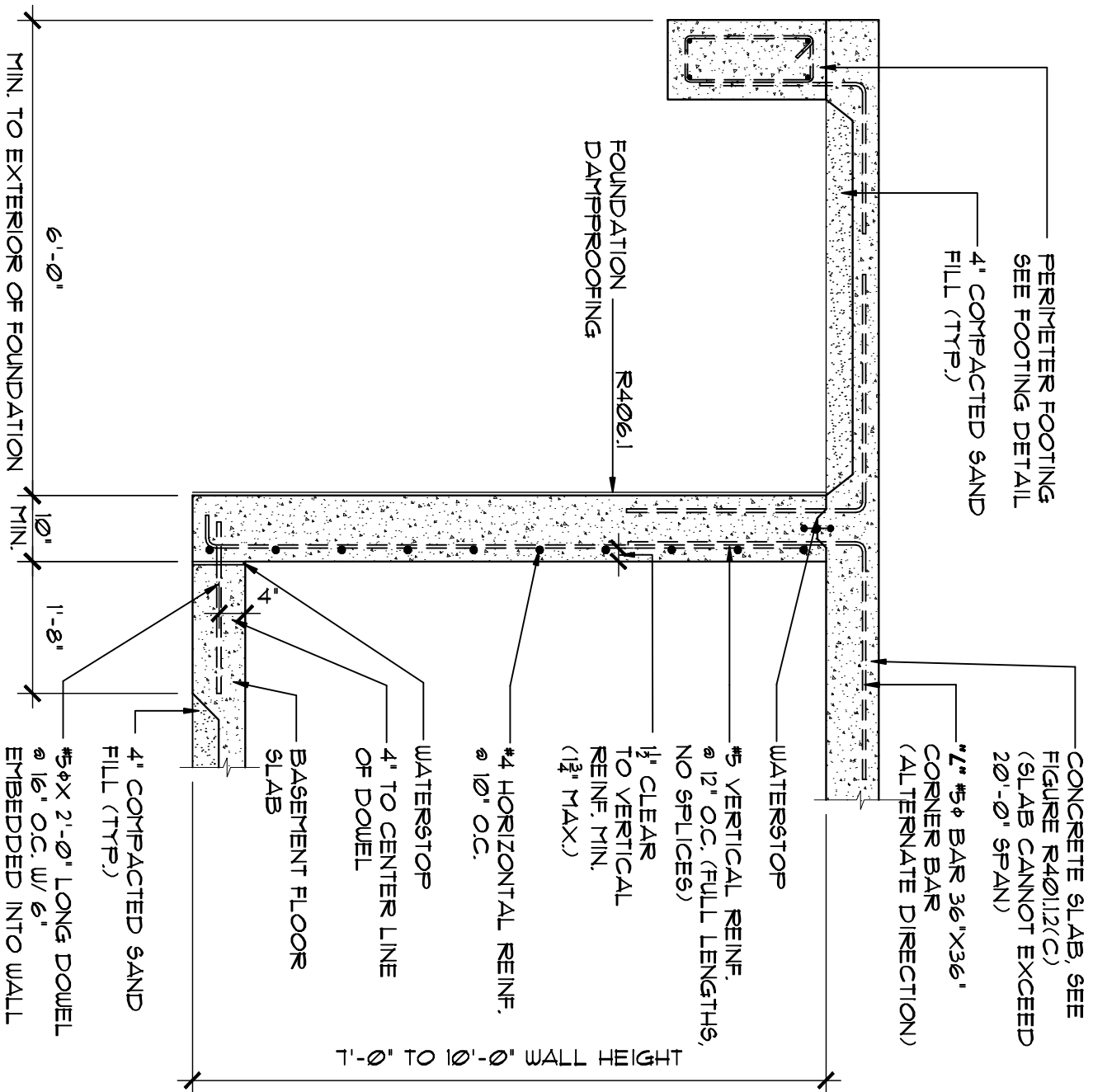




**BASEMENT FLOOR PLAN**  
 SCALE: 1/4" = 1'-0"

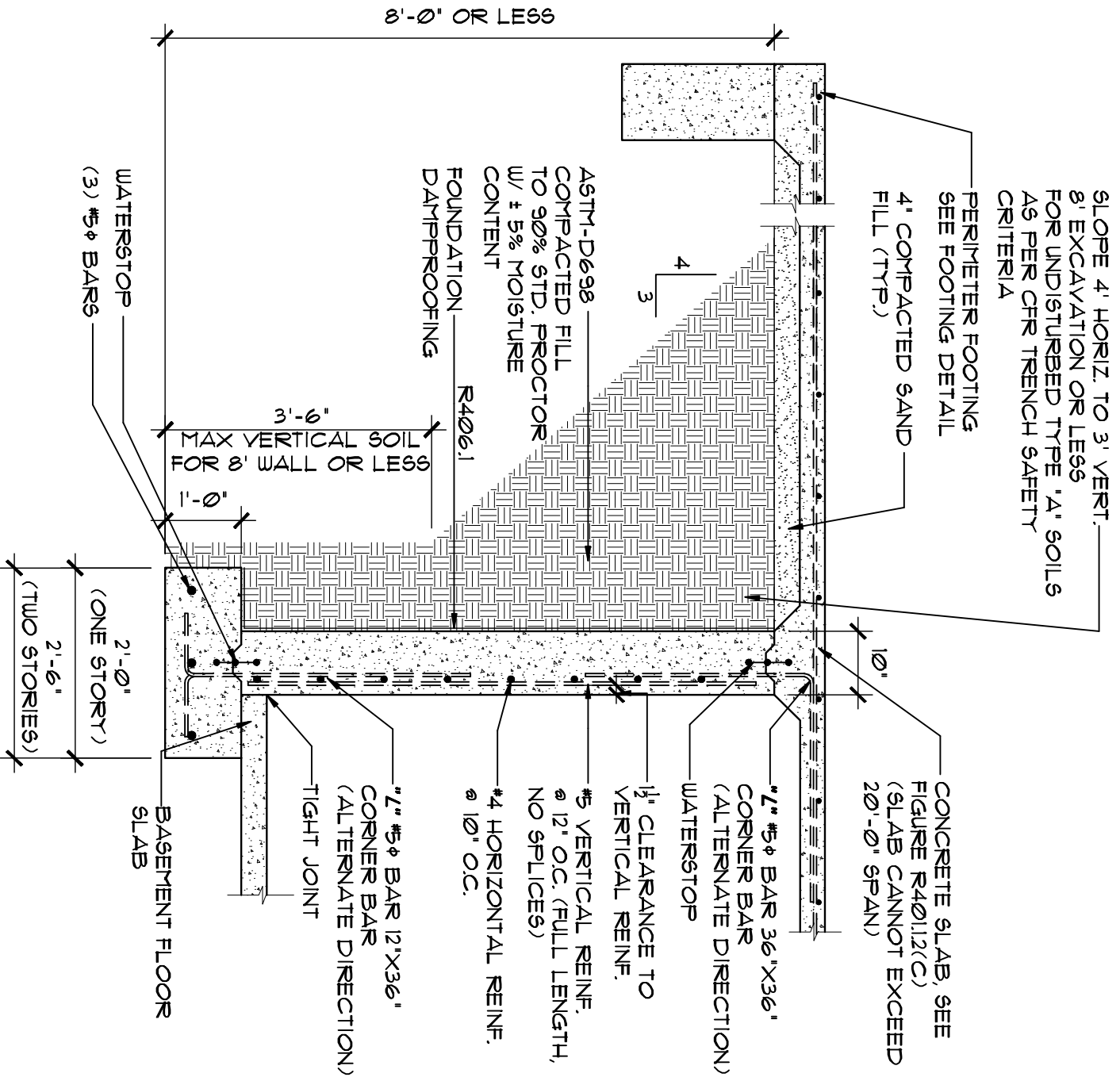


**BASEMENT FLOOR PLAN**  
 SCALE: 1/4" = 1'-0"



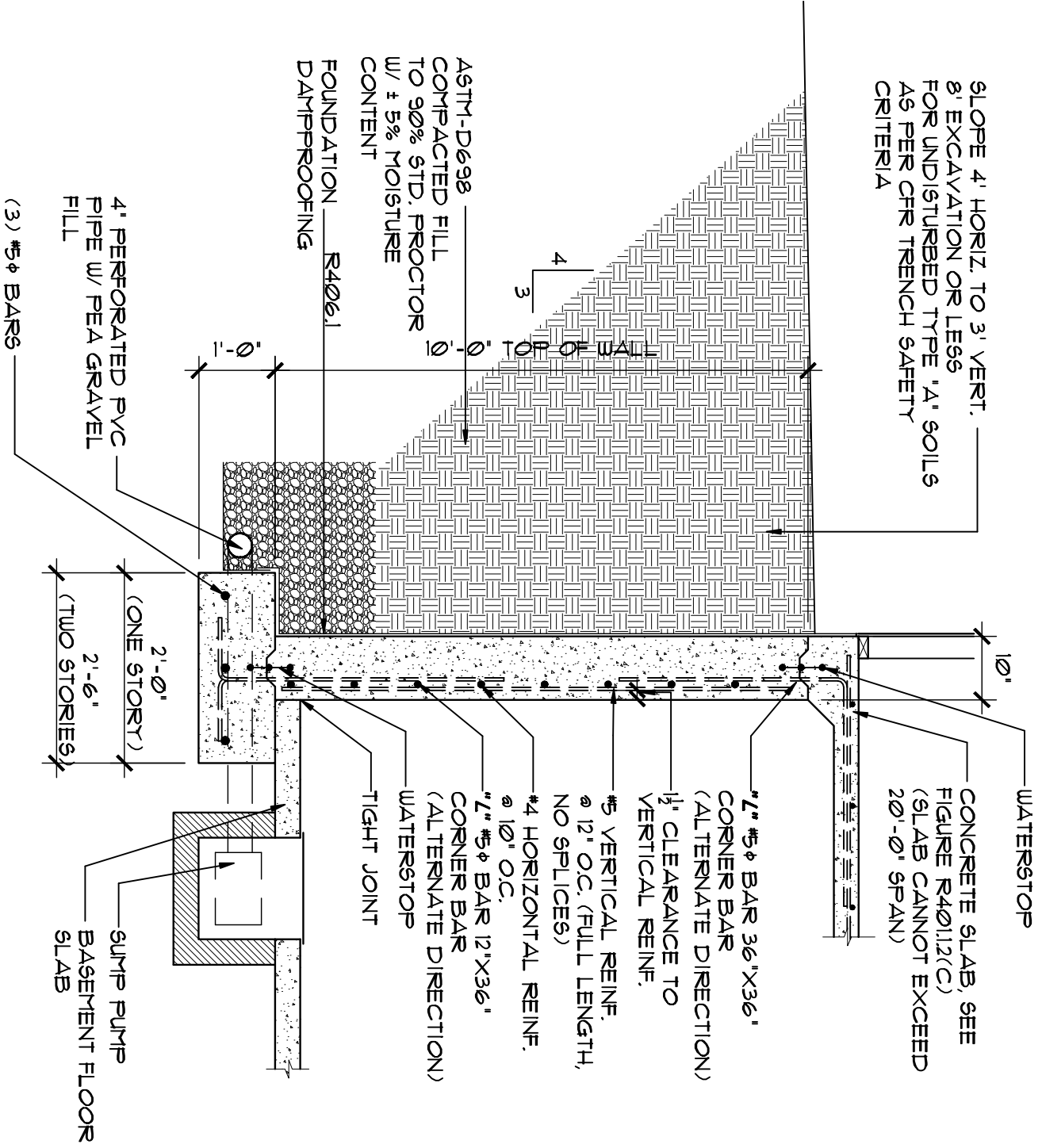
# TRENCHED BASEMENT WALL DETAIL

SCALE: 1/2" = 1'-0"



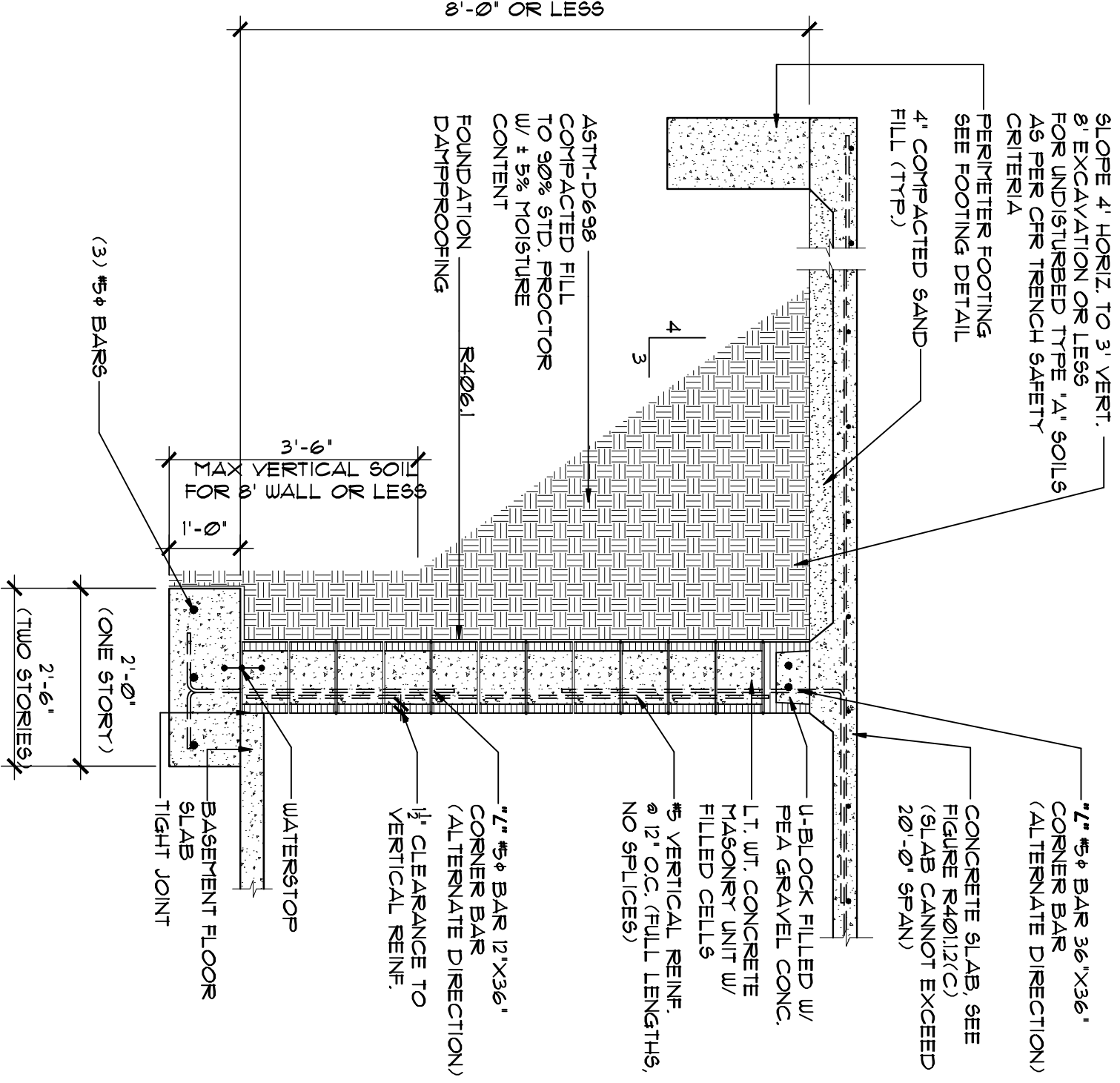
# FORMED BASEMENT WALL DETAIL

SCALE: 1/2" = 1'-0"



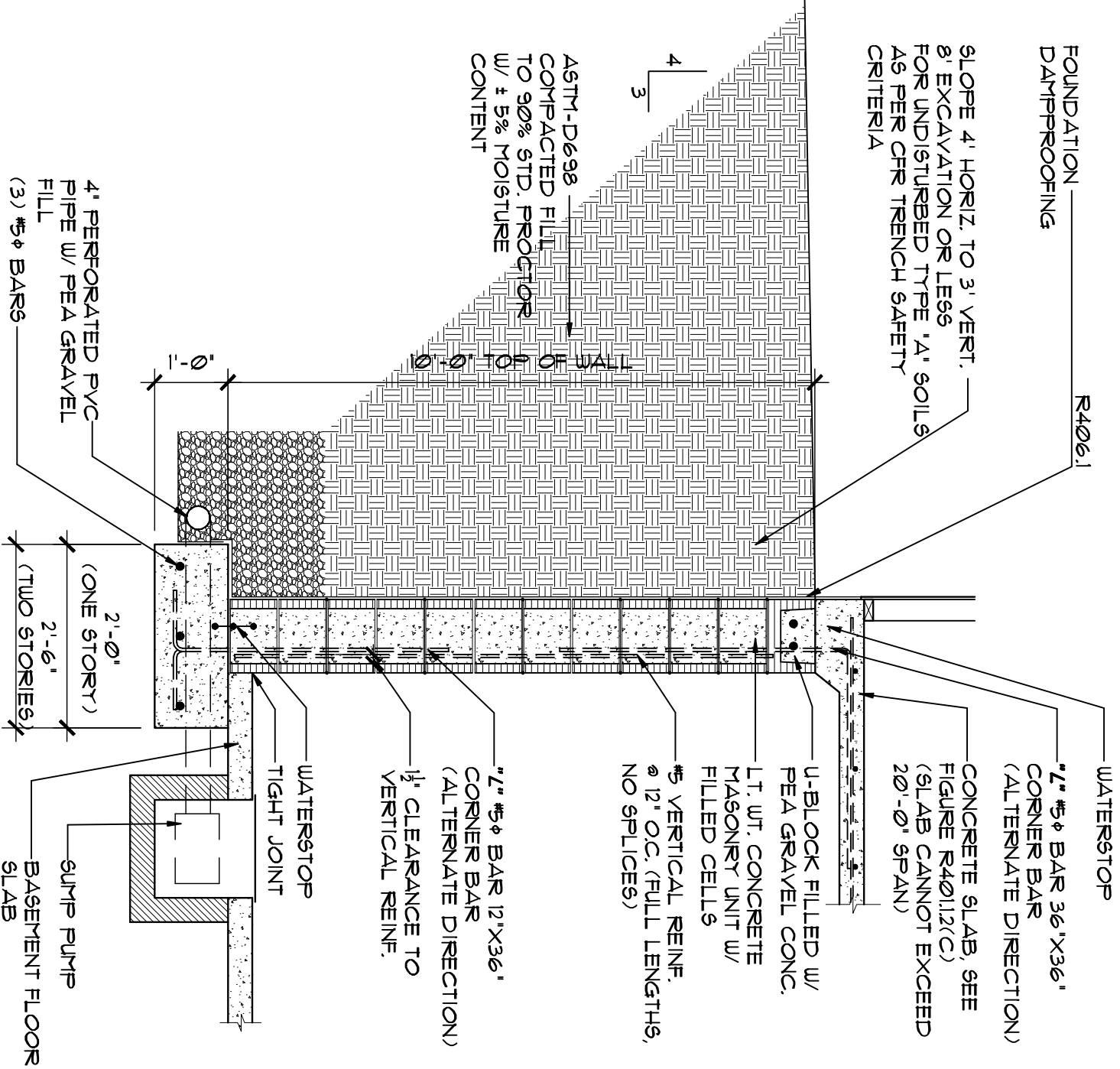
# FORMED BASEMENT PERIMETER WALL DETAIL

SCALE: 1/2" = 1'-0"



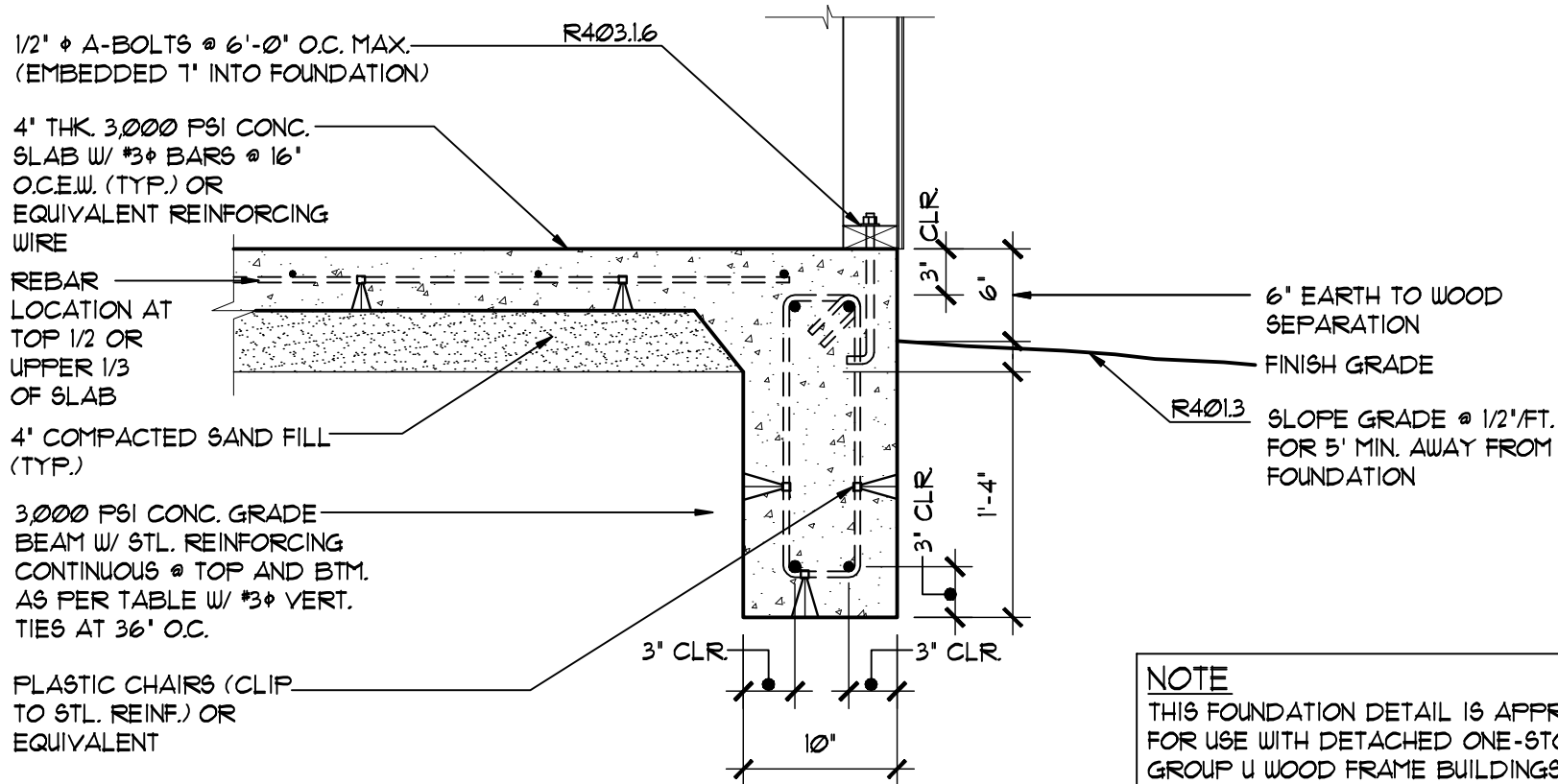
# CMU BASEMENT WALL DETAIL

SCALE: 1/2" = 1'-0"



# CMU BASEMENT PERIMETER WALL DETAIL

SCALE: 1/2" = 1'-0"

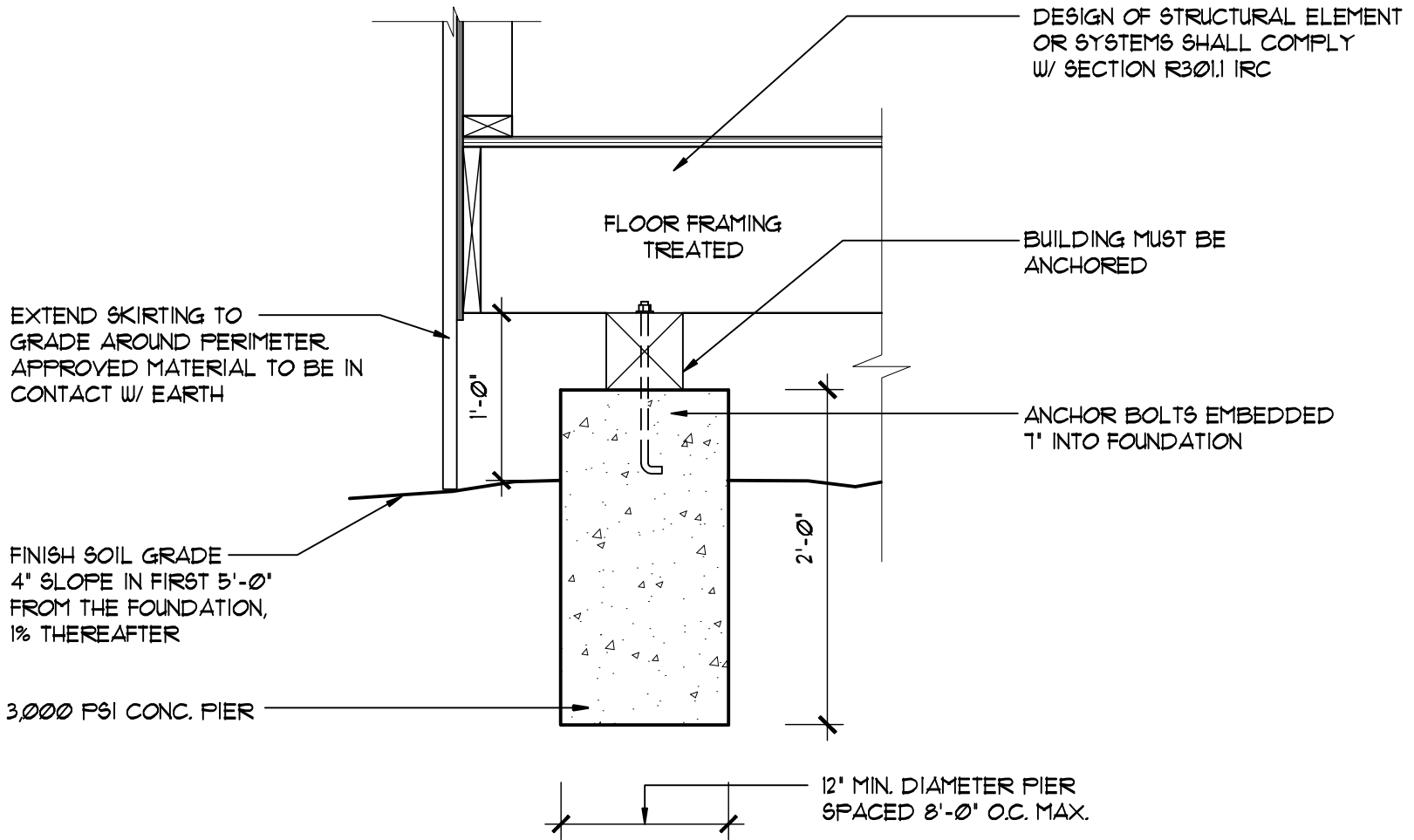


**NOTE**  
THIS FOUNDATION DETAIL IS APPROVED FOR USE WITH DETACHED ONE-STORY GROUP U WOOD FRAME BUILDINGS LESS THAN SIX HUNDRED (600) SQUARE FEET IN GROSS FLOOR AREA, AND LOCATED ON THE SAME SITE WITH A GROUP R-3 OCCUPANCY.

# ACCESSORY BUILDING, MONOLITHIC SLAB ON GRADE FOOTING

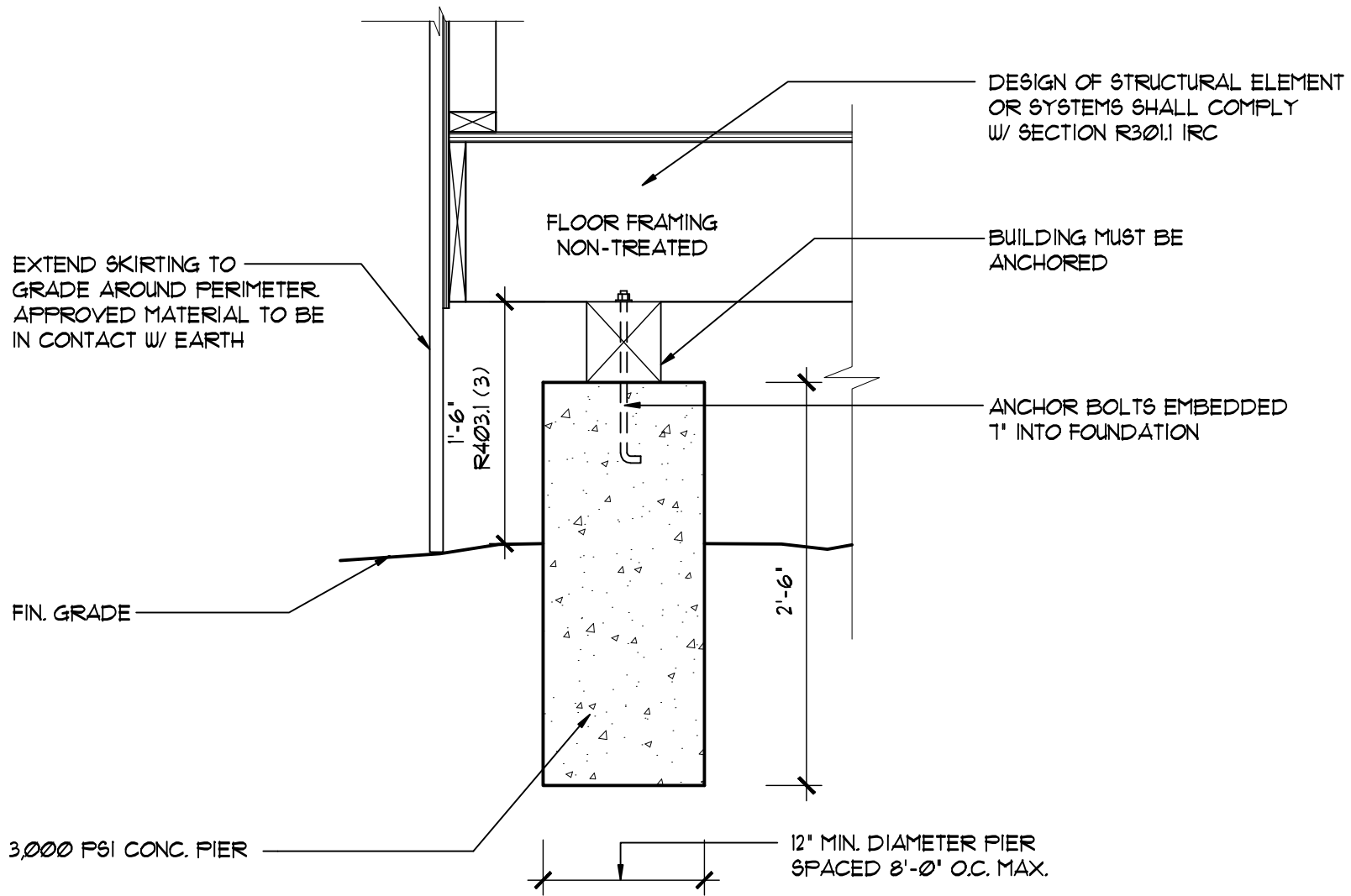
SCALE: 1" = 1'-0"





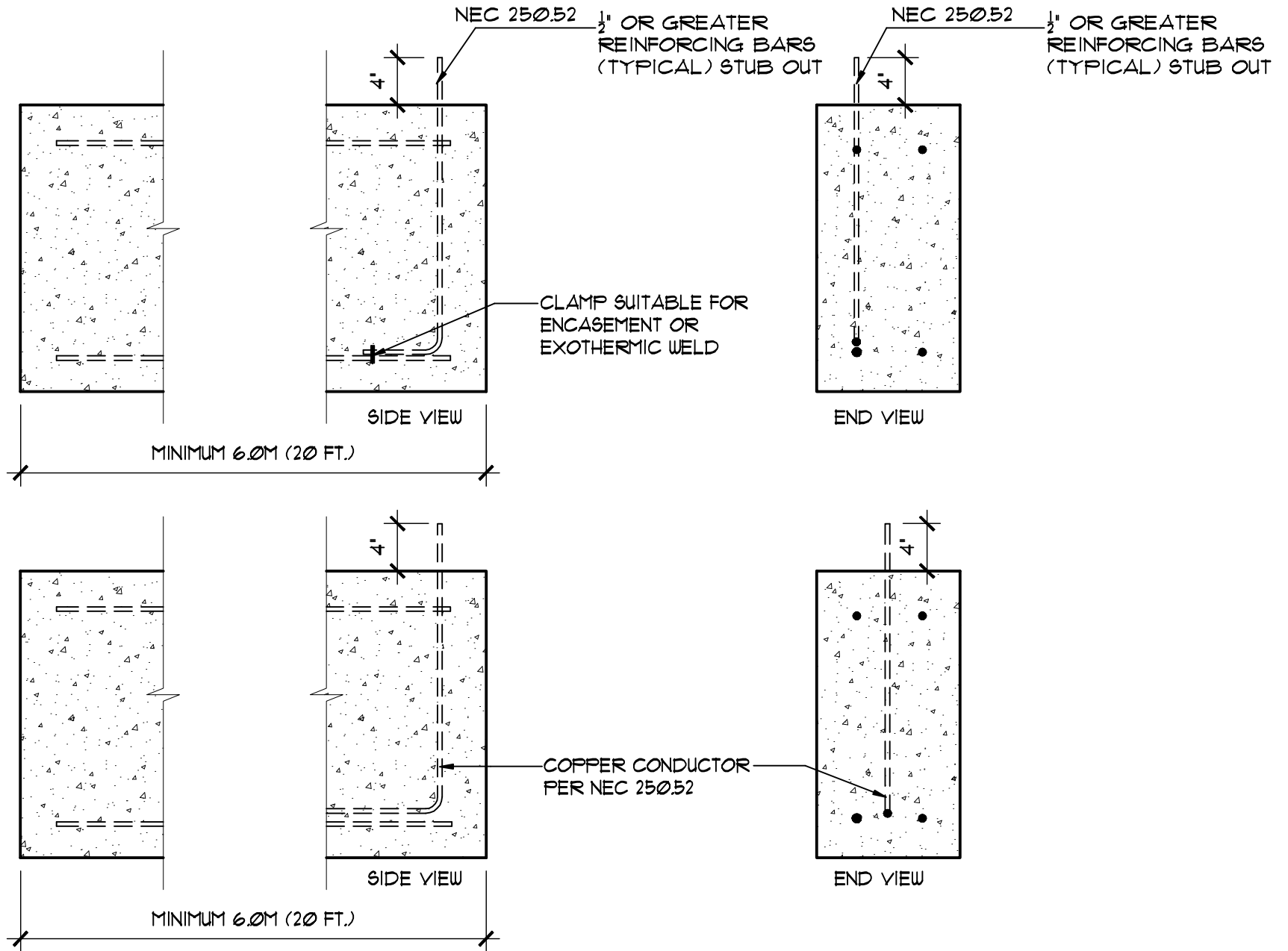
# RESIDENTIAL ACCESSORY BUILDING, TREATED FLOOR SYSTEM

SCALE: 1" = 1'-0"



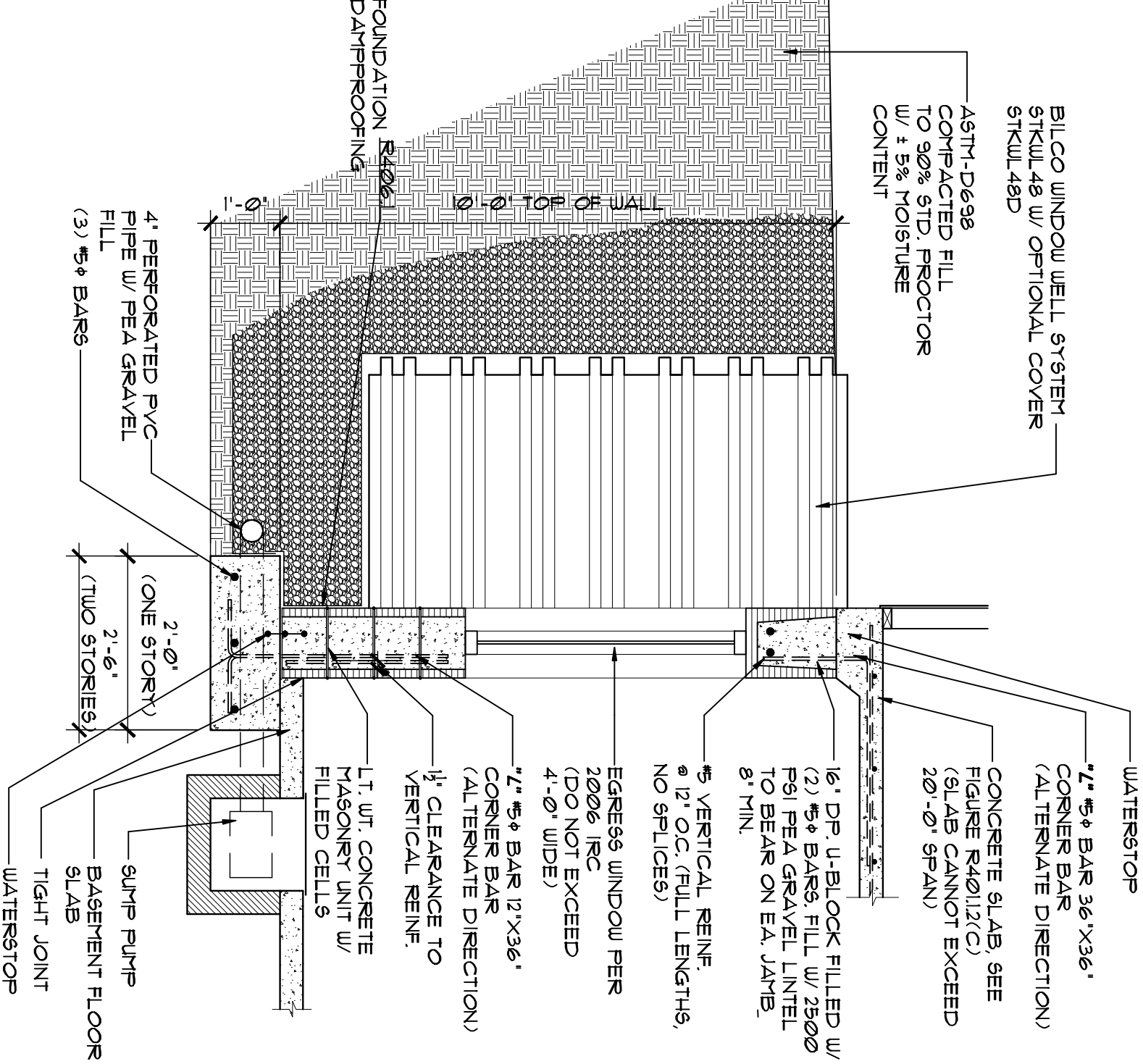
# RESIDENTIAL ACCESSORY BUILDING, NON-TREATED FLOOR SYSTEM

SCALE: 1" = 1'-0"



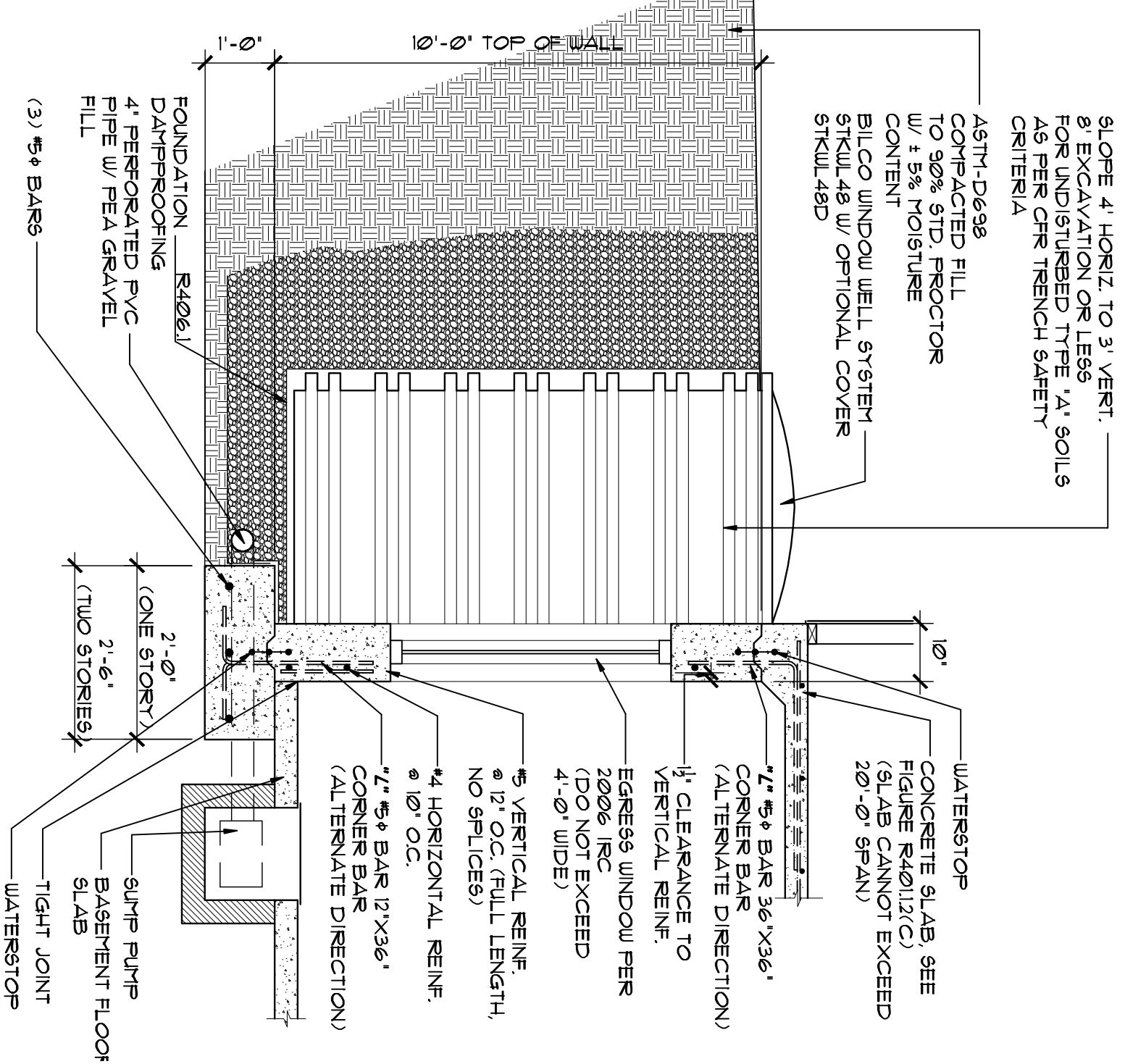
## GROUNDING DETAIL

SCALE: 1" = 1'-0"



# CMU BASEMENT PERIMETER WALL DETAIL

SCALE: 1/2" = 1'-0"



SLOPE 4' HORIZ. TO 3' VERT. —  
 8' EXCAVATION OR LESS  
 FOR UNDISTURBED TYPE 'A' SOILS  
 AS PER CFR TRENCH SAFETY  
 CRITERIA

ASTM-D698  
 COMPACTED FILL  
 TO 90% STD. PROCTOR  
 W/ ± 5% MOISTURE  
 CONTENT  
 BILCO WINDOW WELL SYSTEM  
 STKL48 W/ OPTIONAL COVER  
 STKL48D

WATERSTOP  
 CONCRETE SLAB, SEE  
 FIGURE R401.12(C)  
 (SLAB CANNOT EXCEED  
 20'-0" SPAN)

7" #5 BAR 36" X 36"  
 CORNER BAR  
 (ALTERNATE DIRECTION)  
 1/2" CLEARANCE TO  
 VERTICAL REINF.

EGRESS WINDOW PER  
 2006 IRC  
 (DO NOT EXCEED  
 4'-0" WIDE)

#5 VERTICAL REINF.  
 @ 12" O.C. (FULL LENGTH,  
 NO SPLICES)

#4 HORIZONTAL REINF.  
 @ 10" O.C.

7" #5 BAR 12" X 36"  
 CORNER BAR  
 (ALTERNATE DIRECTION)

FOUNDATION — R406.1  
 DAMPPROOFING  
 4' PERFORATED PVC  
 PIPE W/ PEA GRAVEL  
 FILL  
 (3) #5 BARS

2'-0"  
 (ONE STORY)  
 2'-6"  
 (TWO STORIES)  
 SUMP PUMP  
 BASEMENT FLOOR  
 SLAB  
 TIGHT JOINT  
 WATERSTOP

# FORMED BASEMENT PERIMETER WALL DETAIL

SCALE: 1/2" = 1'-0"

This manual is provided as an aid to homeowners, builders, and specialty contractors. It was created in an effort to provide a simple to understand manual intended to meet and exceed the minimum standards set forth in the International Residential Code. This manual does not take into account all possible situations and requires the permit holder to ensure site conditions permit the use of this manual.

The following individuals, companies, and references contributed to this publication:

Amarillo Testing & Engineering  
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Gregg Bliss Architect  
Dana Williams  
Maricel Gonzales  
American Concrete Institute (ACI 318-05)  
Wire Reinforcement Institute (WRI)  
City of Amarillo Construction Advisory and Appeals Board  
Structural Standards sub-committee  
City of Amarillo Department of Building Safety

This document is provided by and published by the City of Amarillo, Department of Building Safety only to be used as a guide. It is not intended to replace the basic need for good engineering judgment based on appropriate education, experience, wisdom and ethics in any particular engineering application.

This material was published in May 2008 for use with 2006 International Residential Code.

**If you have comments, questions or suggestions, please feel free to contact us at (806) 378-3041.**

## References and Links

### The State of Texas

- Texas Residential Construction Commission (TRCC) [www.trcc.state.tx.us](http://www.trcc.state.tx.us)
- Texas Board of Professional Engineers [www.tbpe.state.tx.us](http://www.tbpe.state.tx.us)
- Texas Board of Architectural Examiners [www.tbae.state.tx.us](http://www.tbae.state.tx.us)
- Texas State Board Plumbing Examiners (TSBPE) [www.tsbpe.state.tx.us](http://www.tsbpe.state.tx.us)
- Texas Department of Licensing and Regulation (TDLR) [www.license.state.tx.us](http://www.license.state.tx.us)
- Texas Commission on Environmental Quality (TCEQ) [www.tceq.state.tx.us](http://www.tceq.state.tx.us)

### Panhandle Associations

- Texas Panhandle Inspectors Association (TPIA)
- Texas Panhandle Builders Association (TPBA) [www.tpba.org](http://www.tpba.org)
- American Institute of Architects (AIA) [www.aia.org](http://www.aia.org)
- American Society of Civil Engineers (ASCE) [www.asce.org](http://www.asce.org)
- Construction Specifications Institute (CSI) [www.csinet.org](http://www.csinet.org)
- Associated Plumbing Heating Cooling Contractors (PHCC) [www.phcc-tx.org](http://www.phcc-tx.org)
- Independent Electrical Contractors Association (IECA)
- Panhandle Roofing Contractors

### National Standards

- International Code Council (ICC) [www.iccsafe.org](http://www.iccsafe.org)
- Energy Systems Laboratory Texas A & M University <http://esl.eslwin.tamu.edu>
- National Storm Shelter Association / TX Tech  
<http://www.wind.ttu.edu/Shelters/Shelters.php>
- American Concrete Institute (ACI) [www.concrete.org](http://www.concrete.org)
- Wire Reinforcement Institute (WRI) [www.wirereinforcementinstitute.org](http://www.wirereinforcementinstitute.org)



This publication provides interpretive drawings considered to comply or exceed the requirements of the 2006 International Residential Code and are approved for use in One & Two Family Dwellings in the following municipalities:

- City of Amarillo
- City of Canyon
- City of Tulia
- City of Dalhart
- City of Dimmitt
- City of Dumas