

IN-RESIDENCE SHELTER

INDEX OF DRAWINGS

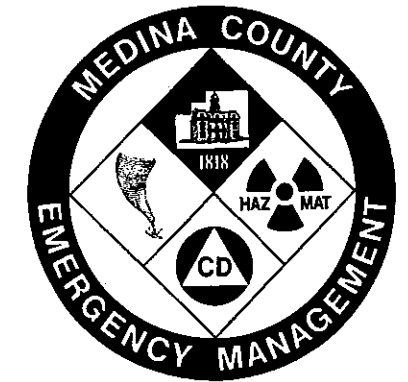
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MEDINA COUNTY
EMERGENCY MANAGEMENT AGENCY

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A Project Impact Community



LIMIT OF LIABILITY:

The designs in this booklet are based on extensive research of the causes and effects of windstorm damage to buildings. Shelters designed and built to these designs should provide a high degree of occupant protection during severe windstorms (hurricanes and tornadoes.) Any substitution of either materials or design concepts may decrease the level of occupant protection and/or increase the possibility of personal injury during a severe wind event.

Because it is not possible to predict or test all conditions that may occur during severe windstorms, or control the quality of construction, among other things, the designer does not warrant the design.

The designer neither manufactures nor sells shelters built from this design. The designers have not made and do not make any representation, warranty, or covenant, express or implied, with respect to the design, condition, quality, durability, operation, fitness for use, or suitability of the shelter in any respect whatsoever. Designers shall not be obligated or liable for actual, incidental, consequential, or other damages of or to users of shelters or any other person or entity arising out of or in connection with the use, condition, and/or performance of shelters built from this design or from the maintenance thereof.

INDEX SHEET

DRAWING NO.: 1

SHEET 1 OF 14

DATE: OCTOBER 1998



FEDERAL EMERGENCY MANAGEMENT AGENCY
MITIGATION DIRECTORATE WASHINGTON, DC

IN-RESIDENCE SHELTER

GENERAL NOTES

1. CONCRETE:

- A. ALL CONCRETE SHALL HAVE STONE AGGREGATE (NORMAL WEIGHT). 28-DAY COMPRESSIVE STRENGTH (f_c) SHALL BE 3000 PSI MINIMUM FOR CAST-IN-PLACE CONCRETE.
- B. REINFORCING BARS SHALL BE MILD STEEL WITH A MINIMUM YIELD STRENGTH OF 60 KSI.
- C. REINFORCING BAR PROTECTION:
 - 1. CONCRETE PLACED AGAINST EARTH 3"
 - 2. CONCRETE PLACED IN FORMS 1-1/2"
- D. REINFORCING BAR PLACEMENT TOLERANCE IS 1/2" IN ANY DIRECTION.
- E. SPLICING OF REINFORCEMENT IS NOT PERMITTED EXCEPT AS SHOWN ON THE DRAWINGS. BARS SHALL BE LAP SPLICED AT ALL CORNERS. SPLICE LENGTHS AS FOLLOWS:
 - 1. #4 BARS 24"
 - 2. #5 BARS 30"
- F. WELDED WIRE REINFORCEMENT: LAP ONE AND ONE-HALF MESH SPACES AT SPLICES AND WIRE IN CONTACT.
- G. FIELD WELDING OF REINFORCEMENT IS NOT PERMITTED.
- H. ALL REINFORCING BAR BENDS SHALL BE MADE MECHANICALLY. HEAT-BENDING IS NOT PERMITTED.

2. MASONRY:

- A. MASONRY UNITS SHALL DEVELOP ULTIMATE COMPRESSIVE STRENGTH (f_m) OF 1500 PSI AT 28-DAYS.
- B. MORTAR TO BE TYPE M OR S PER ASTM C270-97
- C. REINFORCING BARS SHALL BE MILD STEEL WITH A MINIMUM YIELD STRENGTH OF 60 KSI.
- D. REINFORCING BAR PLACEMENT TOLERANCE IS 1/2" IN ANY DIRECTION.
- E. SPLICING OF REINFORCING BARS IS NOT PERMITTED EXCEPT AS SHOWN ON THE DRAWINGS. SPLICE LENGTHS AS FOLLOWS:
 - 1. #4 BARS 24"
 - 2. #5 BARS 30"
- F. HORIZONTAL TRELLIS (WIRE) REINFORCEMENT INSTALLED AT EVERY OTHER COURSE: LAP ONE AND ONE-HALF MESH SPACES AT SPLICES AND AT CORNERS.

3. WOOD:

- A. FRAMING LUMBER TO HAVE MODULUS OF ELASTICITY = 1,200,000 PSI MIN. AND $F_b = 850$ PSI MIN. FOR NORMAL DURATION LOADING. EXAMPLES OF ACCEPTABLE GRADE AND SPECIES OF FRAMING LUMBER INCLUDE #2 AND BETTER SOUTHERN PINE, DOUGLAS FIR, HEM-FIR, AND SPRUCE - PINE - FIR.
- B. PLYWOOD TO BE RATED SHEATHING SPAN RATING 24/16, MIN. 23/32 THICKNESS.
- C. ALL WOOD SILL PLATES TO BE .40 CCA P.T. LUMBER.
- D. NAILS TO BE COMMON WIRE NAILS.

4. COLD-FORMED (LIGHT-GAUGE) STEEL SHEATHING:

- A. YIELD STRENGTH FOR METAL IS 36 KSI MINIMUM.
- B. ALL METAL SHALL BE G60 GALVANIZED BY THE MANUFACTURER.

- 5. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS AND QUANTITIES PRIOR TO STARTING CONSTRUCTION.
- 6. THE CONSTRUCTION DRAWINGS SHALL NOT BE SCALED. DIMENSIONS APPLY.
- 7. IF THERE IS A CONFLICT AMONG THE GENERAL NOTES, SPECIFICATIONS, AND PLANS, THE ORDER OF PRECEDENCE IS NOTES, THEN SPECIFICATIONS, THEN PLANS.
- 8. THE CONSTRUCTION DRAWINGS REPRESENT THE FINISHED STRUCTURE. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING ALL MEASURES NECESSARY TO ENSURE THAT THE STRUCTURE IS PROTECTED DURING CONSTRUCTION. THESE MEASURES INCLUDE (BUT ARE NOT LIMITED TO) SHORING AND BRACING FOR CONSTRUCTION LOADS AND WORKER SAFETY PURPOSES.
- 10. FOLLOW MANUFACTURER'S RECOMMENDATION'S FOR NAILING REQUIREMENTS OF UPLIFT/SHEAR RESISTANCE CONNECTORS.
- 11. ALL PLYWOOD JOINTS SHOULD BE SOLIDLY BLOCKED W/2X4'S
- 12. WALL & CEILING PENETRATIONS THROUGH THE MISSILE PROTECTION SHEATHING ARE TO BE MINIMIZED.
- 13. CONDUIT & OTHER VERTICAL RUNS IN WALLS SHOULD BE COLLECTED AND RUN IN THE CHASE.
- 14. DO NOT DRILL THROUGH WALL STUDS OR TOP AND BOTTOM PLATES FOR PLUMBING SUPPLY LINES OR VENTS. INSTALL ALL PLUMBING SUPPLY LINES AND VENTS IN PLUMBING CHASE.
- 15. VENTILATION IS TO BE PROVIDED IN ACCORDANCE WITH THE LOCAL BUILDING CODE. VENTILATION MAY BE EITHER NATURAL OR MECHANICAL SUCH THAT MINIMUM VENTILATION IS 0.5 AIR CHANGES / HOUR.
- 16. THE DESIGNS SHOWN ARE COMPLIANT WITH THE 1997 NEHRP RECOMMENDED PROVISIONS.
- 17. TO ENSURE THE SHELTER PROVIDES THE DESIRED LEVEL OF PROTECTION, A PROFESSIONAL ENGINEER OR ARCHITECT MUST BE CONSULTED FOR ANY DESIGN CONDITIONS FOUND TO BE DIFFERENT FROM THOSE REPRESENTED BY THESE PLANS.
- 18. SEE SHEETS 13 AND 14 OF 14 FOR THE MATERIAL LIST FOR EACH SHELTER DESIGN.

DESIGN BASIS

- 1. LIVE LOADS USED IN DESIGN:
 - A. WIND PRESSURES DEVELOPED FROM 250 - MPH 3-SEC. PEAK GUST IN ACCORDANCE WITH ASCE 7-95.
 - B. WINDBORNE DEBRIS (MISSILE) IMPACT LOADS CREATED BY A 15-LB. 2X4 TRAVELING HORIZONTALLY AT 100 MPH, TRAVELING VERTICALLY AT 67 MPH, AND IMPACTING NORMAL TO WALL SURFACE.
- 2. SOIL BEARING CAPACITY OF 2000 PSF MIN. HAS BEEN ASSUMED.

ABBREVIATIONS

- A.B. - ANCHOR BOLT
- CMU - CONCRETE MASONRY UNIT
- CONC. - CONCRETE
- DBL. - DOUBLE
- DIA. - DIAMETER
- E.W. - EACH WAY
- GA. - GAUGE
- GYP. - GYPSUM
- ICF - INSULATING CONCRETE FORMS
- MAX - MAXIMUM
- MH. - MANHOLE
- MIN. - MINIMUM
- O.C. - ON CENTER
- P.T. - PRESSURE TREATED
- REQD. - REQUIRED
- S.F. - SQUARE FOOT
- SY. - SOUTHERN YELLOW PINE
- TYP. - TYPICAL
- WWF - WELDED WIRE FABRIC
- W - WITH

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The designer neither manufactures nor sells shelters built from this design. The designers have not made and do not make any representation, warranty, or covenant, express or implied, with respect to the design, condition, quality, durability, operation, fitness for use, or suitability of the shelter in any respect whatsoever. Designers shall not be obligated or liable for actual, incidental, consequential, or other damages of or to users of shelters or any other person or entity arising out of or in connection with the use, condition, and/or performance of shelters built from this design or from the maintenance thereof.

GENERAL NOTES

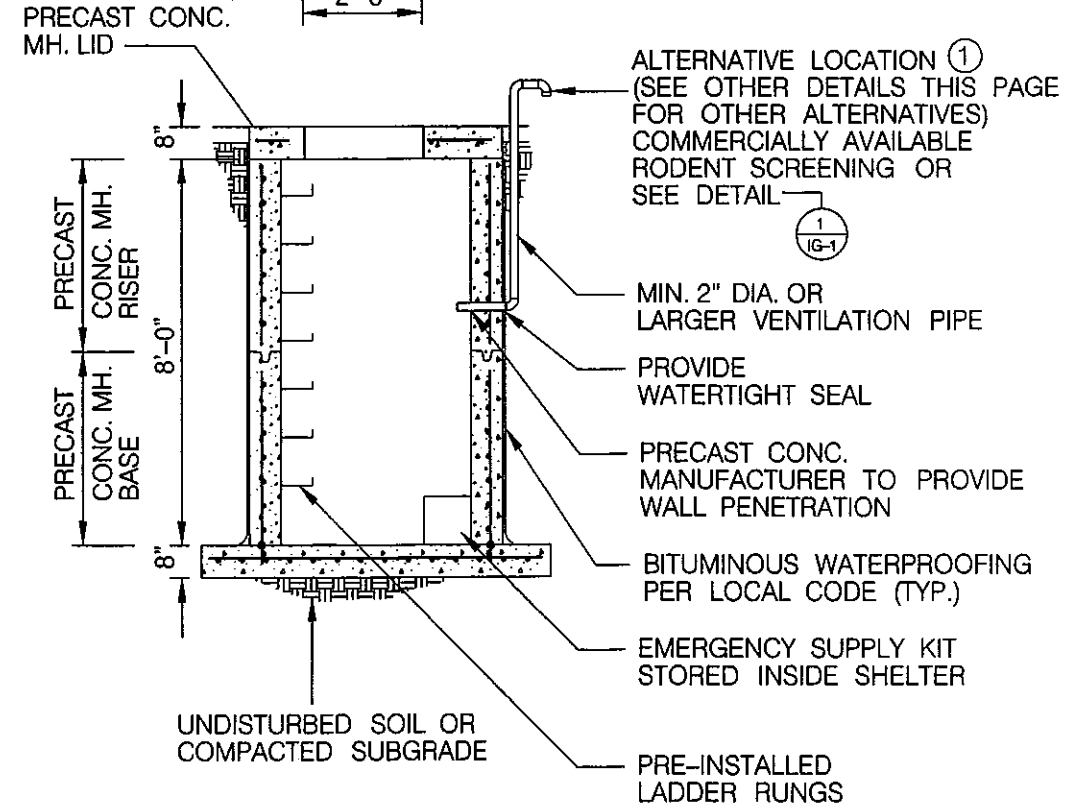
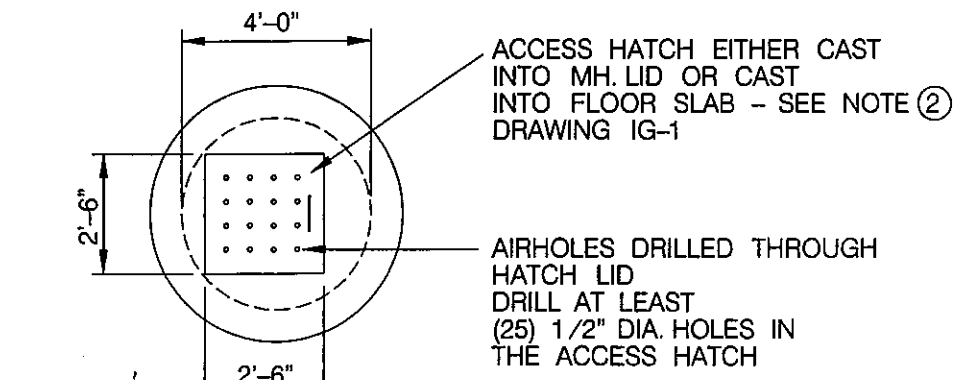
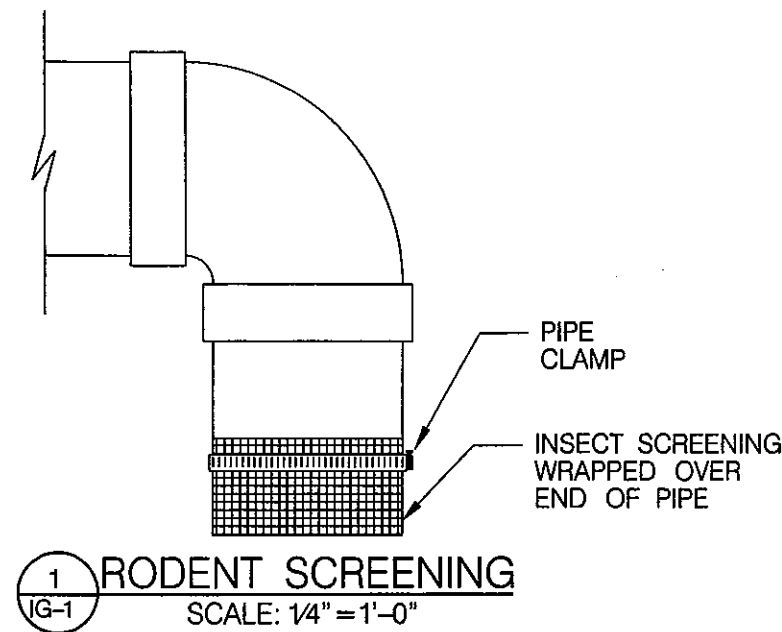
DRAWING NO.: 2

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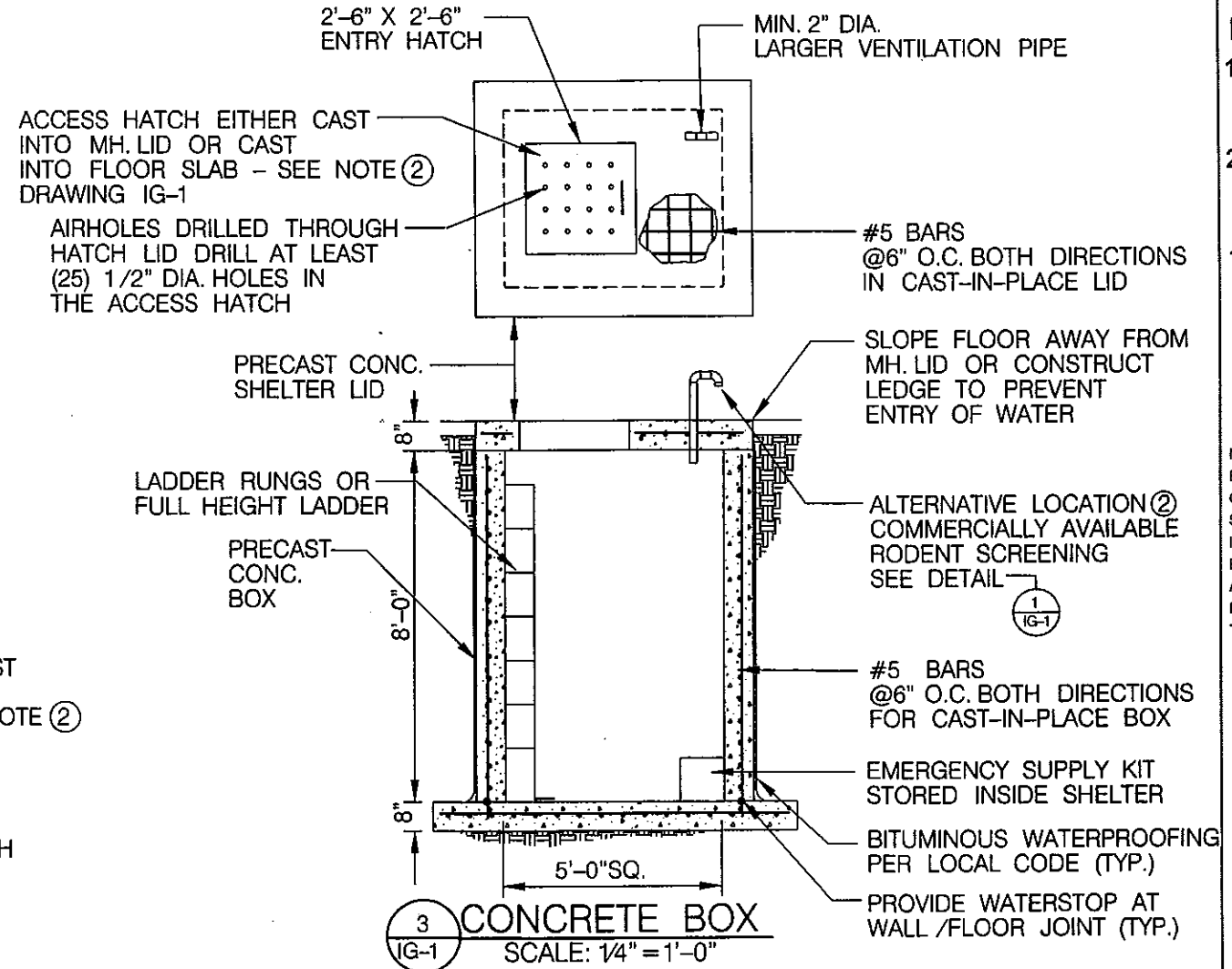
DATE: OCTOBER 1998



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2 IG-1 PRECAST CONCRETE MANHOLE SCALE: 1/4" = 1'-0"



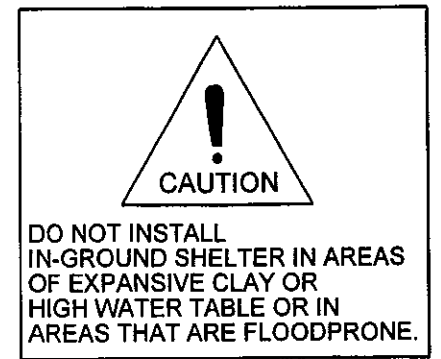
4 IG-1 8" MASONRY BOX SCALE: 1/4" = 1'-0"

NOTES:

- SPACE REQUIRED INSIDE IN-GROUND SHELTER IS MIN. 5 S.F./ PERSON,
- MODEL NOS. & MANUFACTURES FOR HATCH COVERS INCLUDE:

MANUFACTURER	MODEL NO.
ACUDOR-----	FA150
BILCO -----	J4AL
BABCOCK-DAVIS-----	FB4700

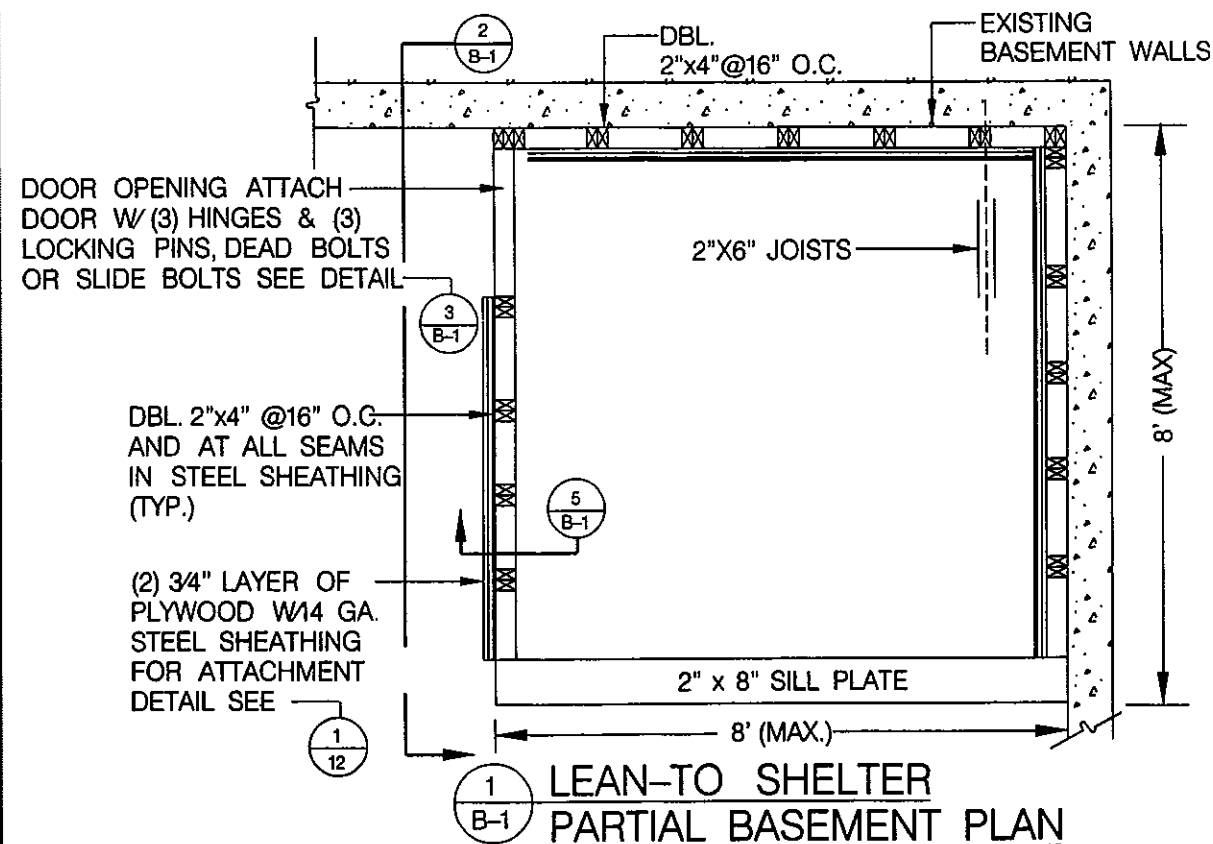
NOTES:
BECAUSE NOT ALL CONTRACTORS ARE FAMILIAR WITH THE TYPE OF HATCH COVERS SHOWN IN THESE DRAWINGS, THE NAMES OF SOME COMPANIES THAT MANUFACTURE HATCH COVERS HAVE BEEN INCLUDED IN THIS TABLE. THE LIST OF COMPANIES IS NOT, HOWEVER, EXHAUSTIVE. ADDITIONALLY, THIS LIST IS NOT INTENDED TO EXPRESS A PREFERENCE FOR THOSE MANUFACTURES AND/OR THEIR PRODUCTS BY THE UNITED STATES GOVERNMENT NOR IS IT AN ENDORSEMENT OF THOSE MANUFACTURES AND/OR THEIR PRODUCTS.



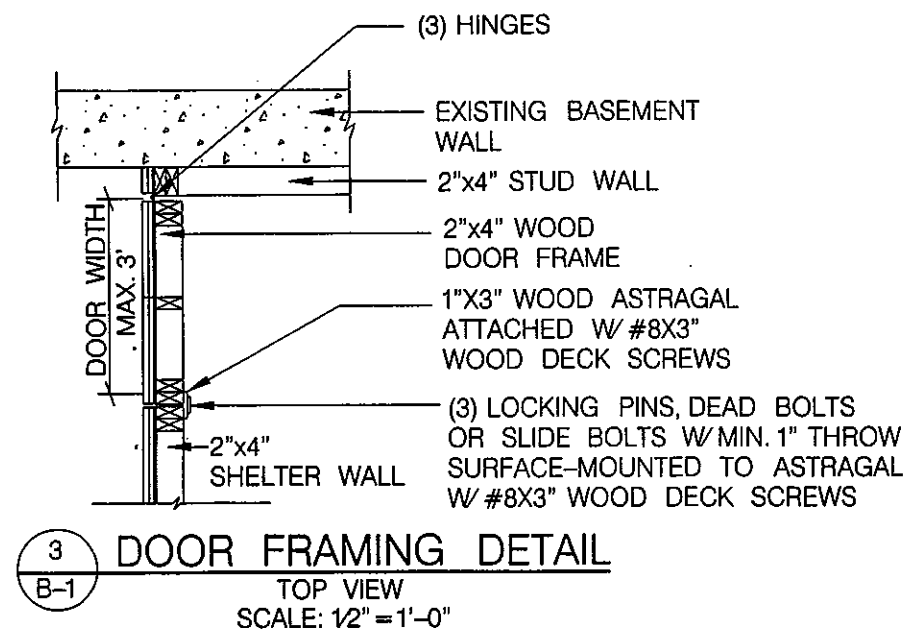
IN-GROUND SHELTERS- SECTIONS AND DETAILS

DRAWING NO.: IG-1 SHEET 3 OF 14
DATE: OCTOBER 1998

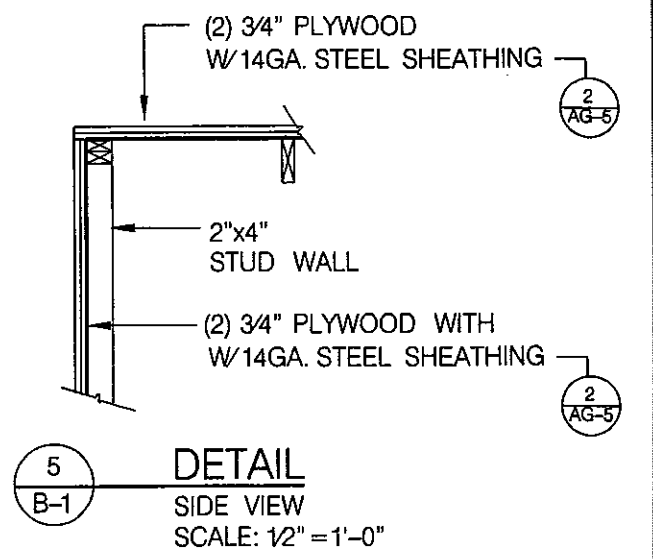




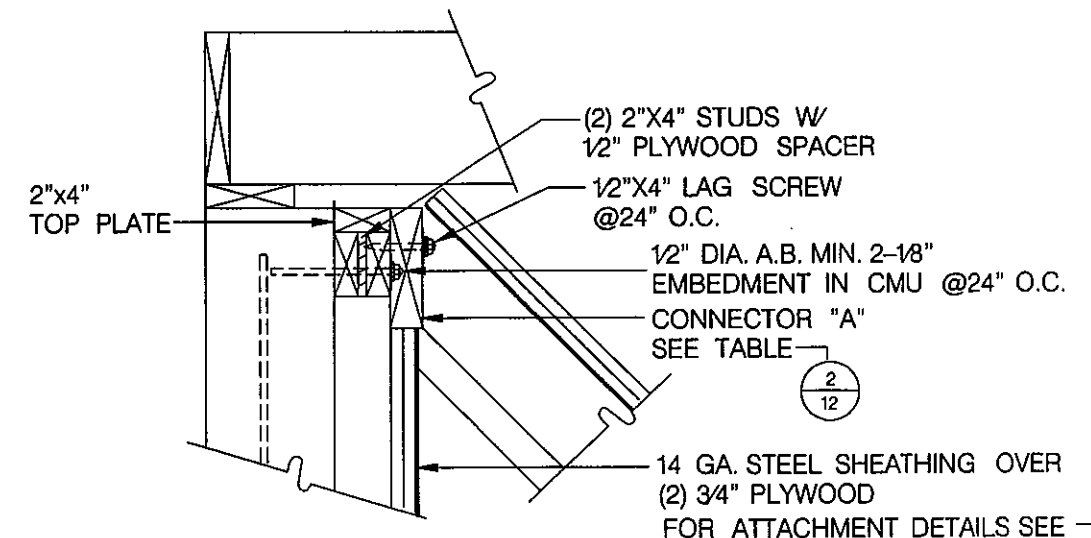
1 LEAN-TO SHELTER PARTIAL BASEMENT PLAN
SCALE: 3/8" = 1'-0"



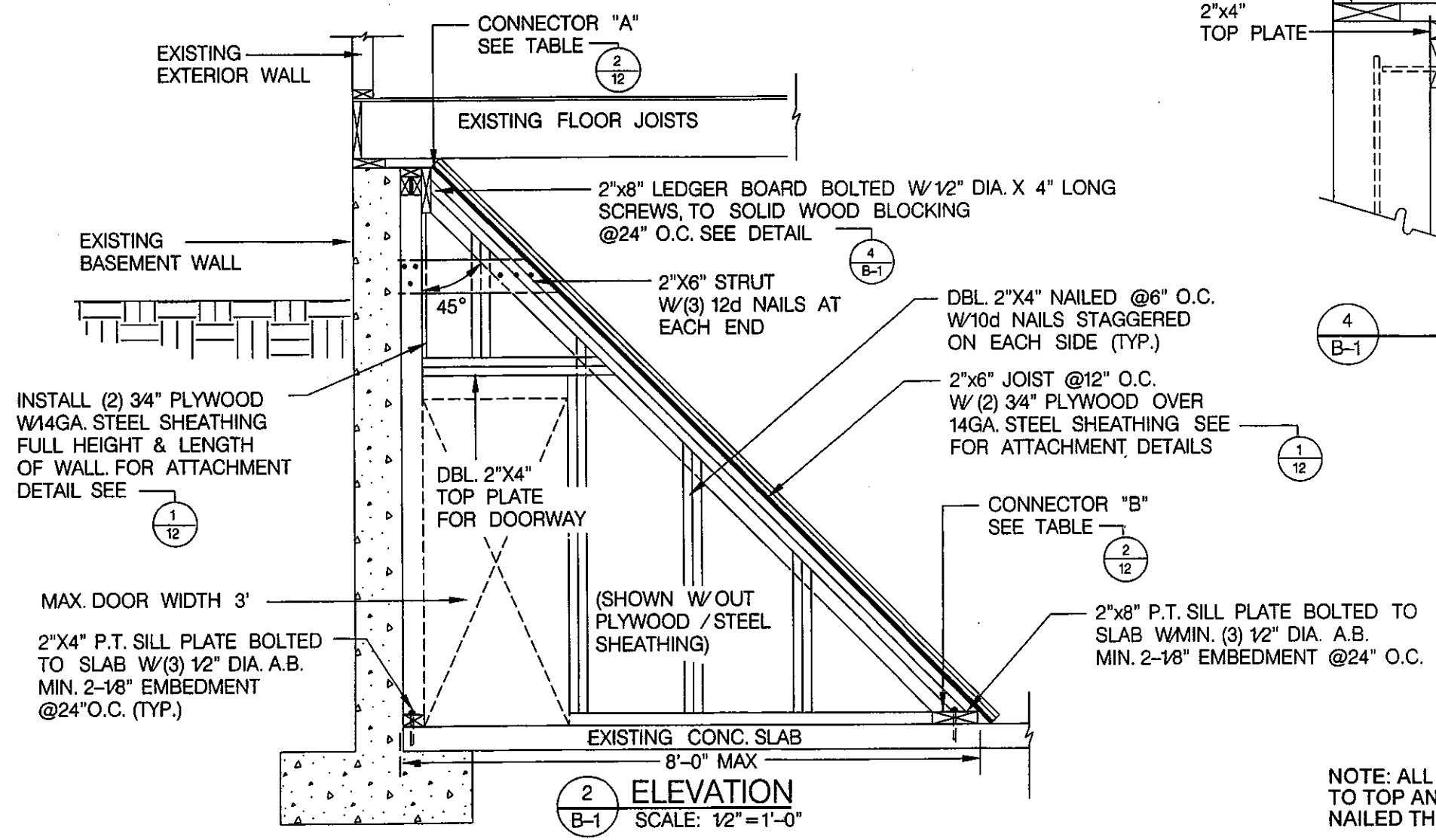
3 DOOR FRAMING DETAIL
TOP VIEW
SCALE: 1/2" = 1'-0"



5 DETAIL
SIDE VIEW
SCALE: 1/2" = 1'-0"




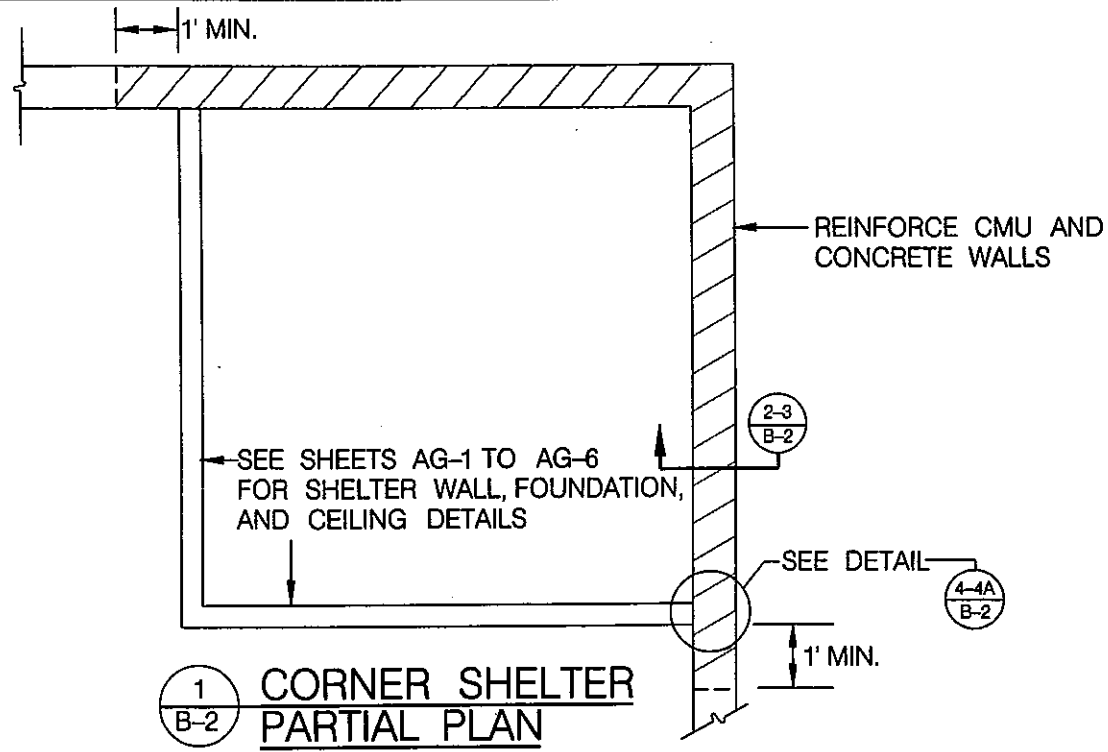
4 DETAIL
SIDE VIEW
SCALE: 1" = 1'-0"



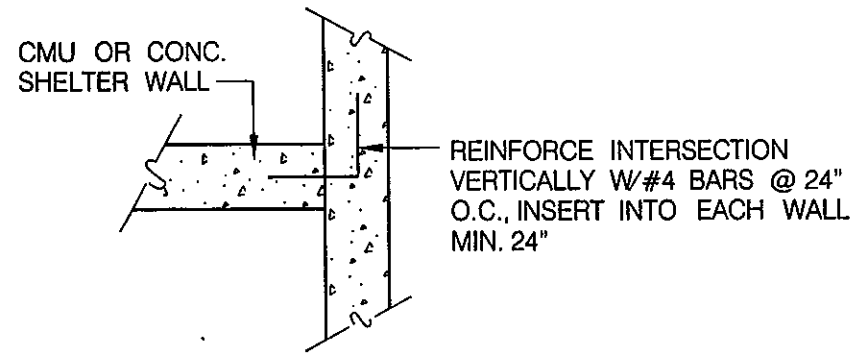
2 ELEVATION
SCALE: 1/2" = 1'-0"

NOTE: ALL WALL STUDS TO BE ATTACHED TO TOP AND BOTTOM PLATES W/ (2) 16d NAILS NAILED THROUGH FROM OUTSIDE

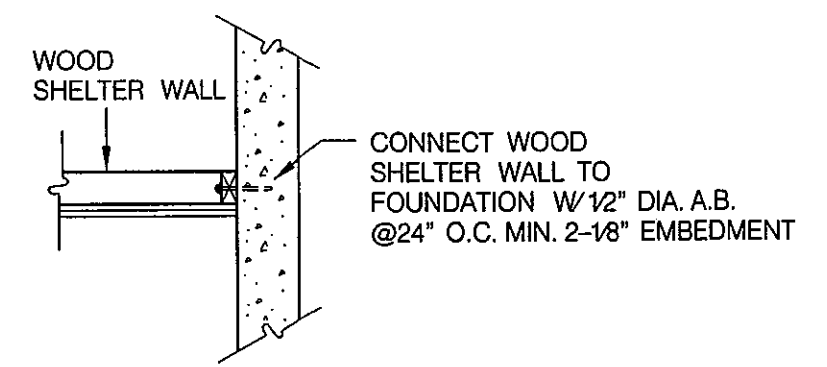
BASEMENT LEAN-TO	
DRAWING NO.: B-1	SHEET 4 OF 14
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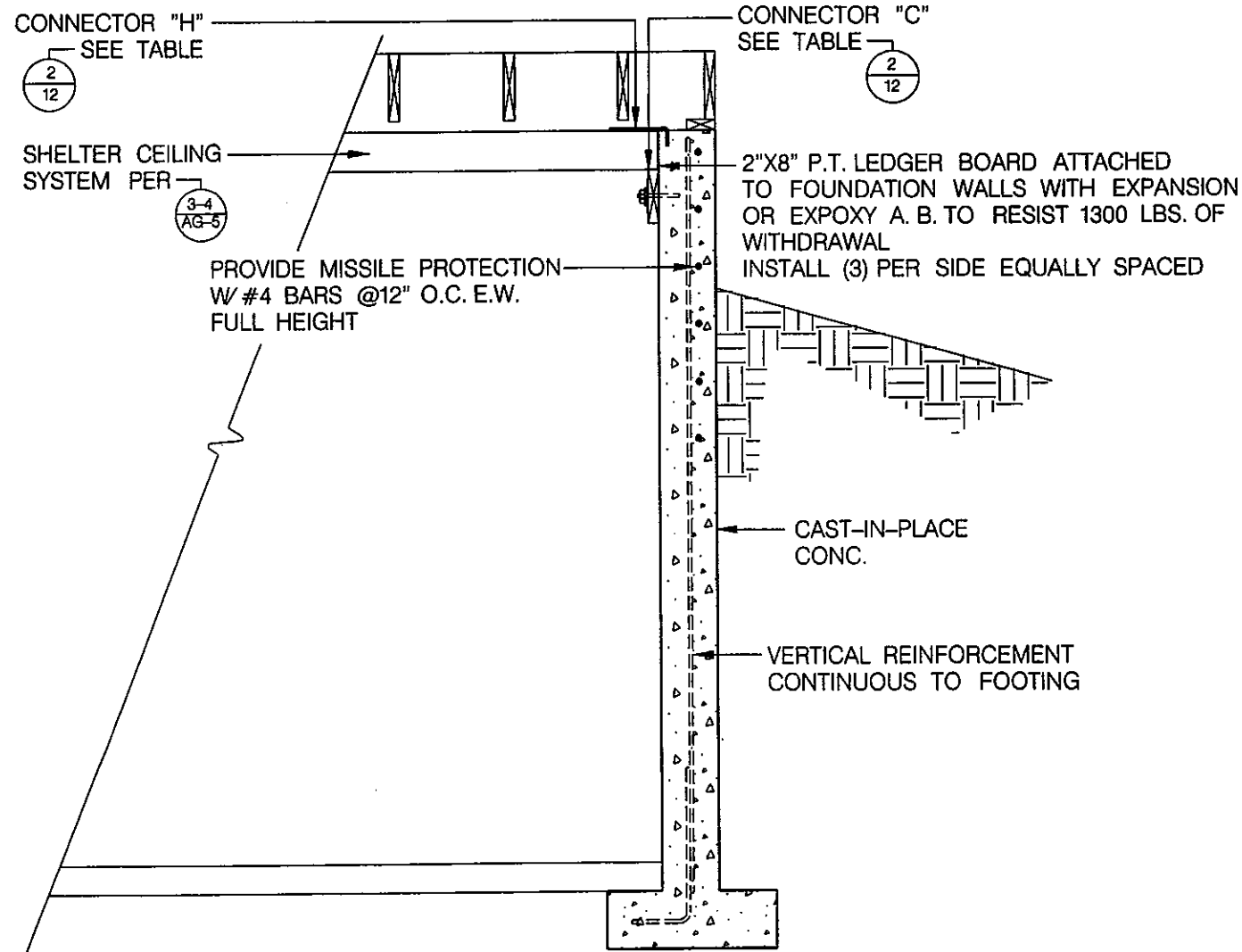
1 CORNER SHELTER PARTIAL PLAN
B-2



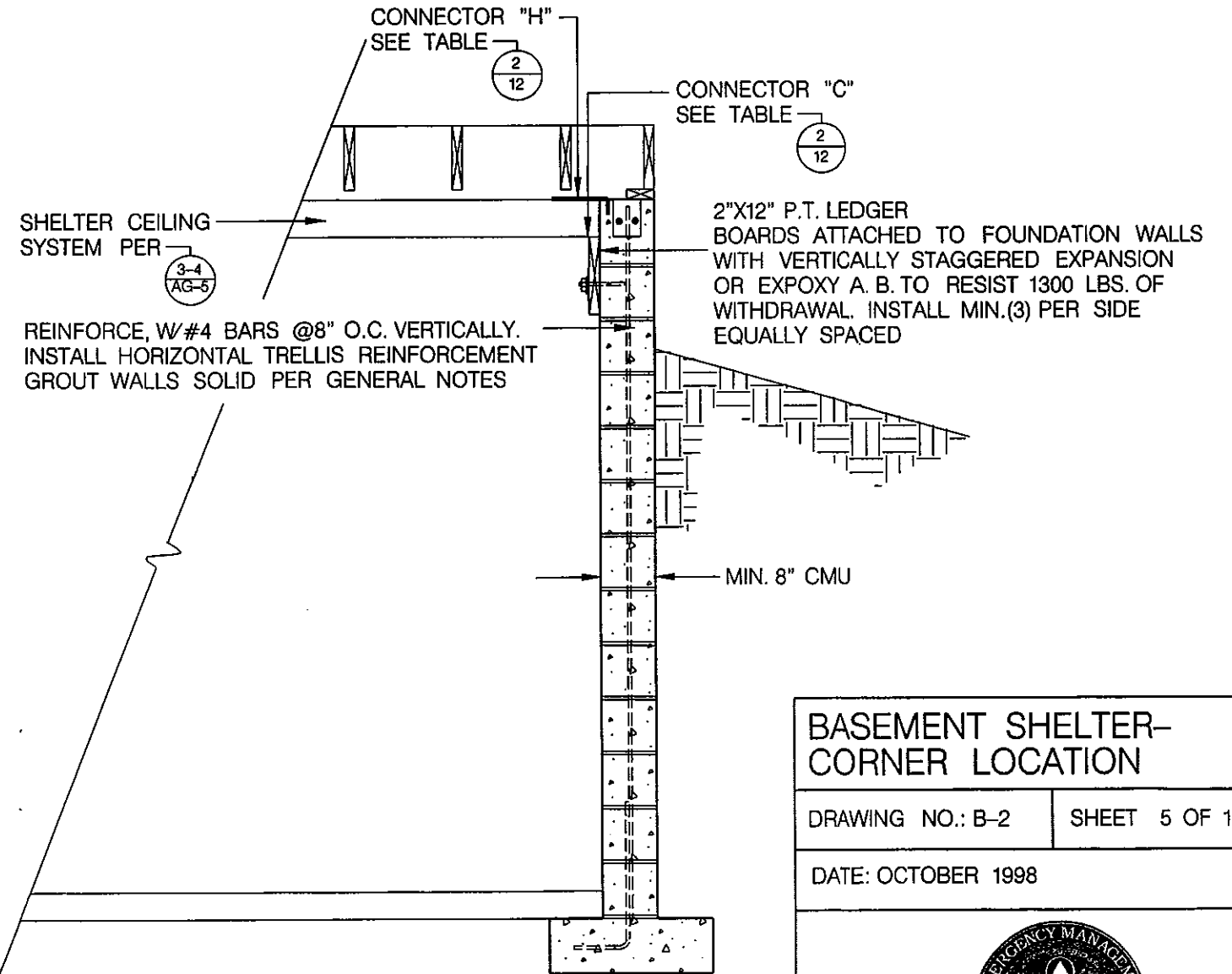
4 ALTERNATIVE: CMU SHELTER TO FOUNDATION DETAIL
B-2
TOP VIEW
SCALE: 1/2"=1'-0"



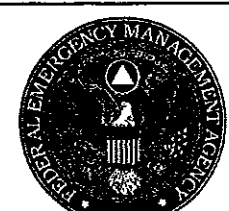
4A ALTERNATIVE: WOOD SHELTER TO FOUNDATION DETAIL
B-2
TOP VIEW
SCALE: 1/2"=1'-0"

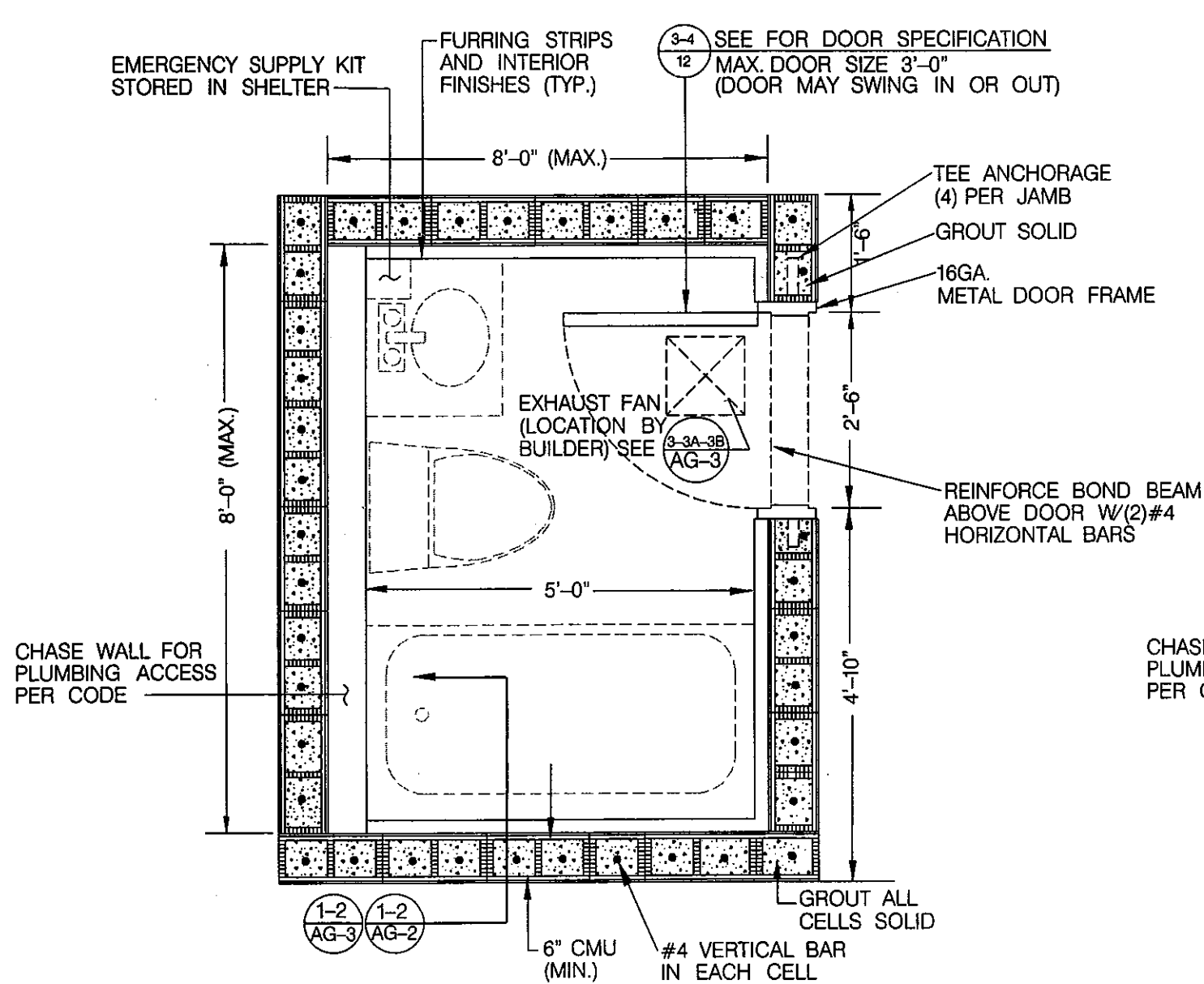


2 ALTERNATIVE: CAST-IN-PLACE CONCRETE FOUNDATION ELEVATION
B-2
SCALE: 1/2"=1'-0"

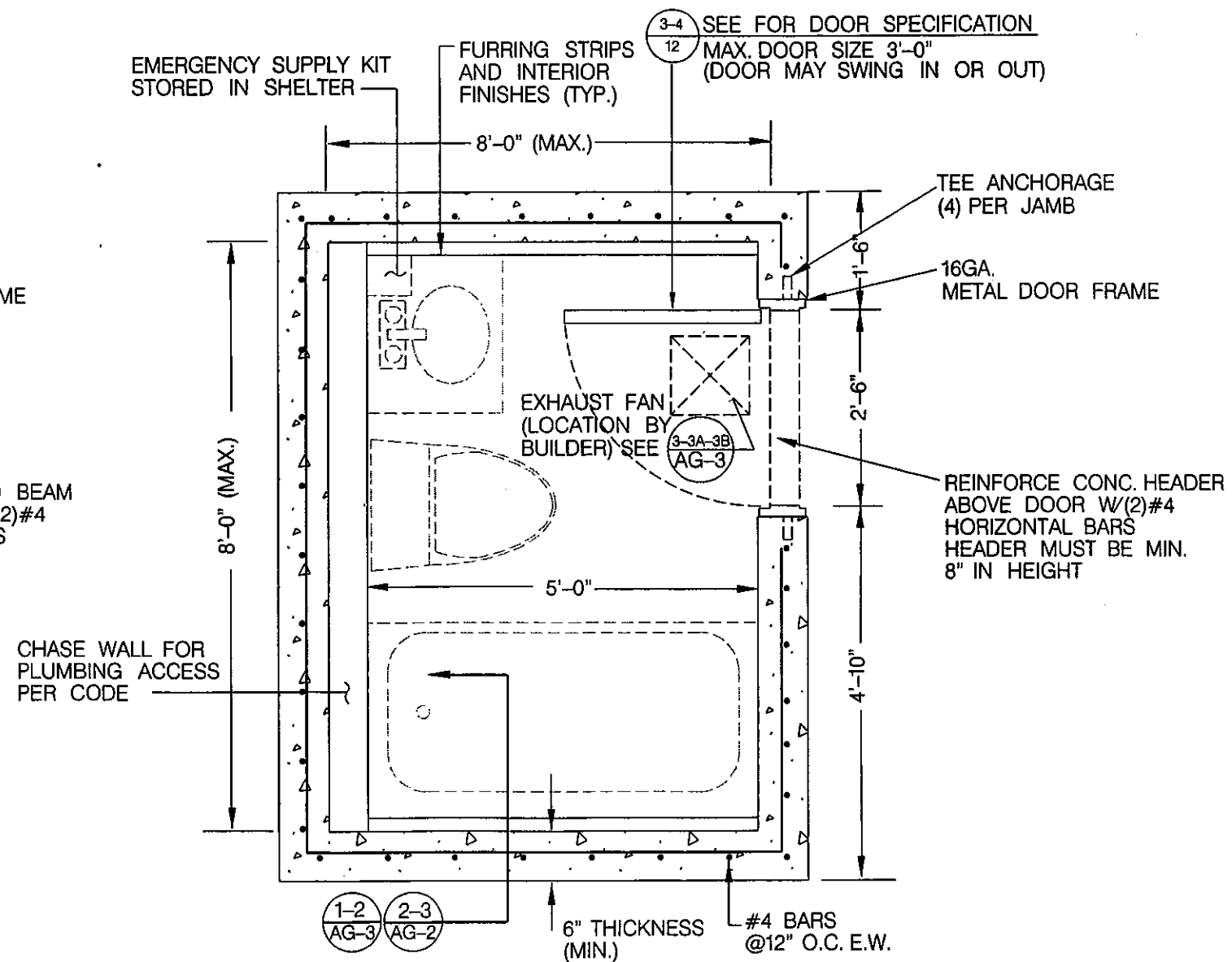


3 ALTERNATIVE: CMU FOUNDATION ELEVATION
B-2
SCALE: 1/2"=1'-0"

BASEMENT SHELTER- CORNER LOCATION	
DRAWING NO.: B-2	SHEET 5 OF 14
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1 TYPICAL PLAN VIEW (CMU)
AG-1 (SHOWN AS BATH FOR ILLUSTRATION)
SCALE: 1/2" = 1'-0"



2 TYPICAL PLAN VIEW (CONCRETE)
AG-1 (SHOWN AS BATH FOR ILLUSTRATION)
SCALE: 1/2" = 1'-0"

NOTE: ICF MAY BE USED AS ALTERNATIVE TO CAST-IN-PLACE CONCRETE

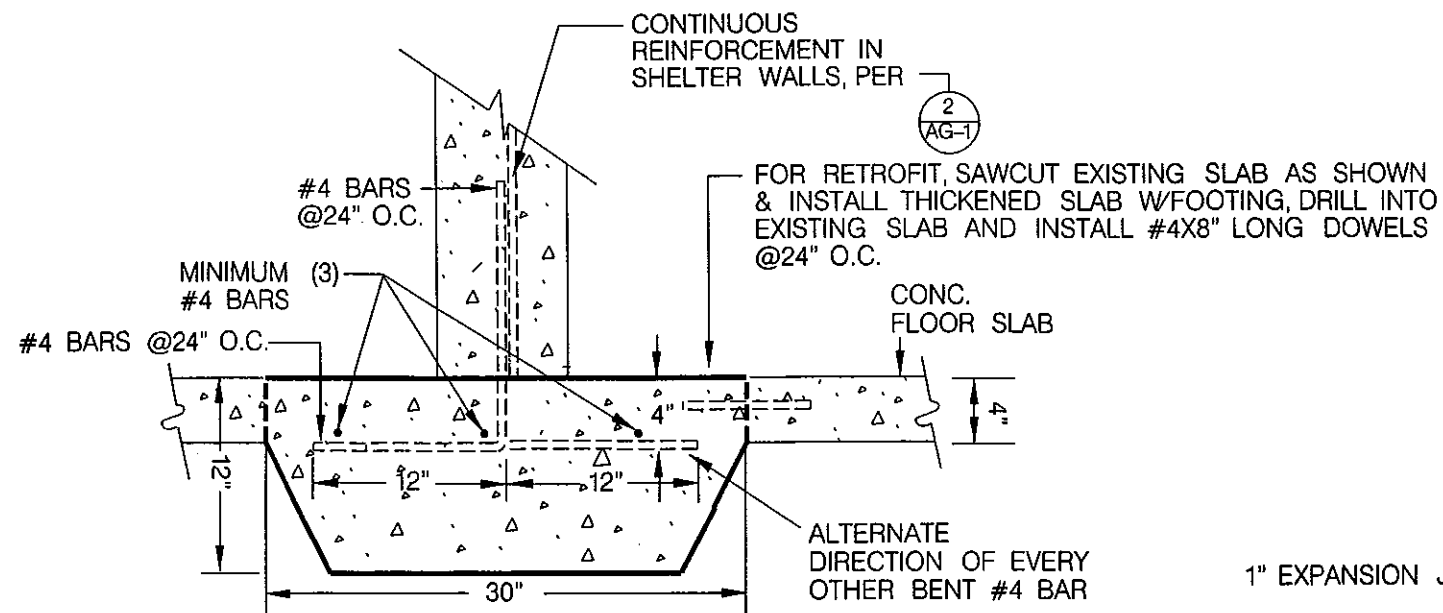
CMU/CONCRETE ALTERNATIVE PLANS

DRAWING NO.: AG-1 SHEET 6 OF 14

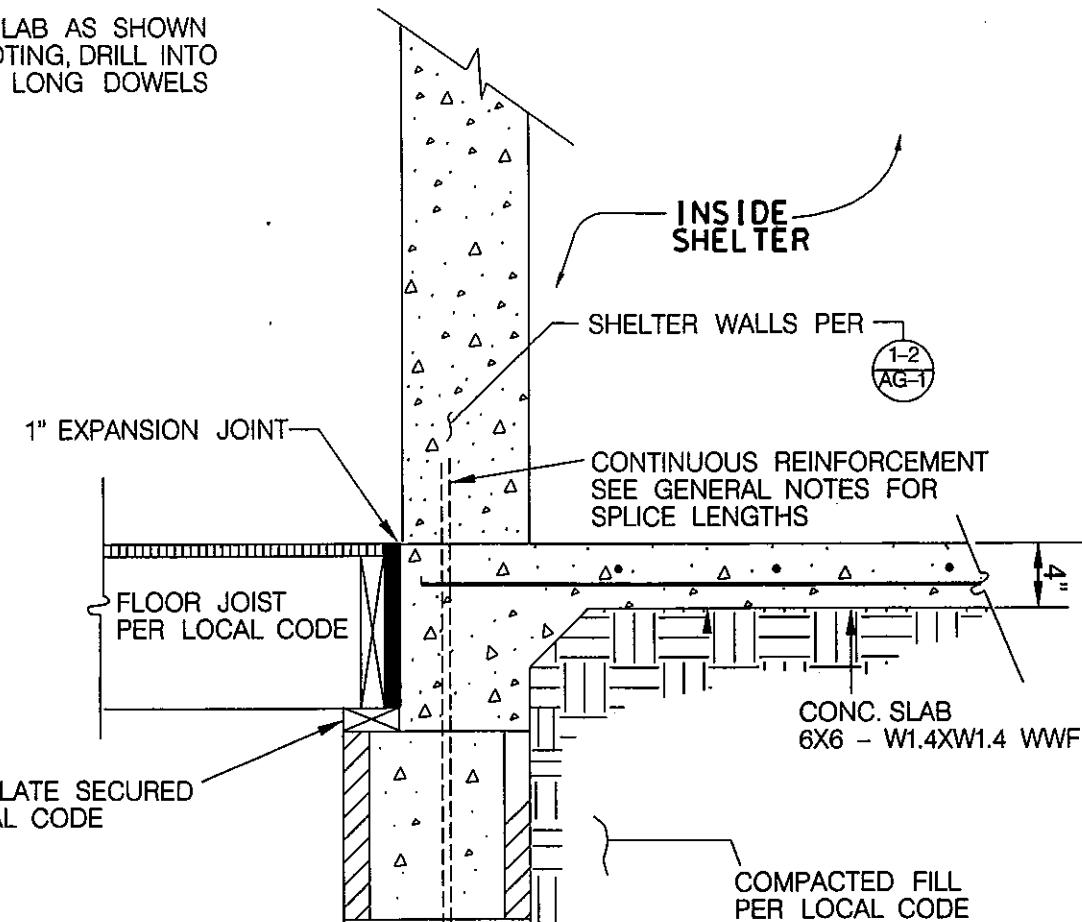
DATE: OCTOBER 1998



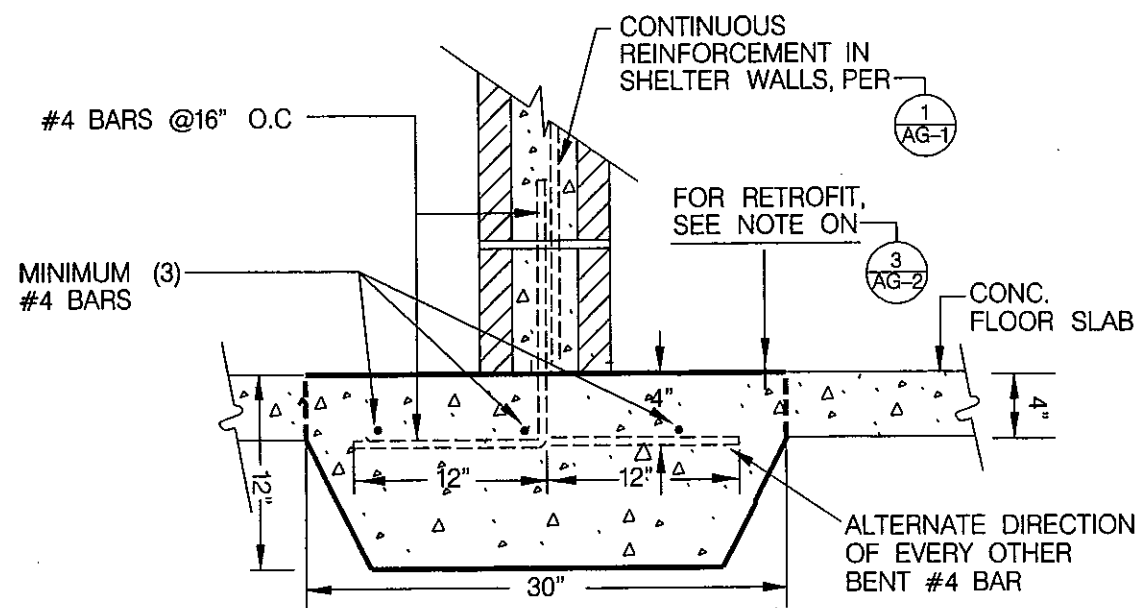
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3 TYPICAL ANCHOR DETAIL FOR
AG-2 CONCRETE WALL ON SLAB-ON-GRADE FOUNDATION
 SCALE: 1" = 1'-0"



2 TYPICAL ANCHOR DETAIL FOR
AG-2 CMU WALL CRAWL SPACE FOUNDATION
 SCALE: 1" = 1'-0"



1 TYPICAL ANCHOR DETAIL FOR
AG-2 CMU WALL ON SLAB-ON-GRADE FOUNDATION
 SCALE: 1" = 1'-0"

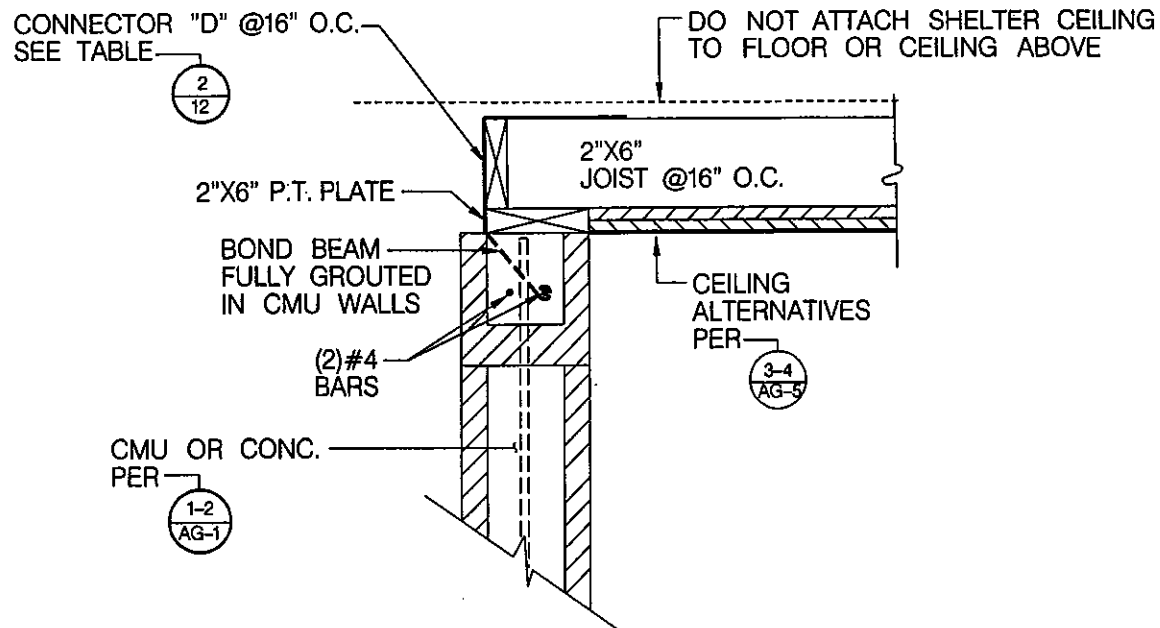
CMU/CONCRETE WALL SECTIONS

DRAWING NO.: AG-2 SHEET 7 OF 14

DATE: OCTOBER 1998

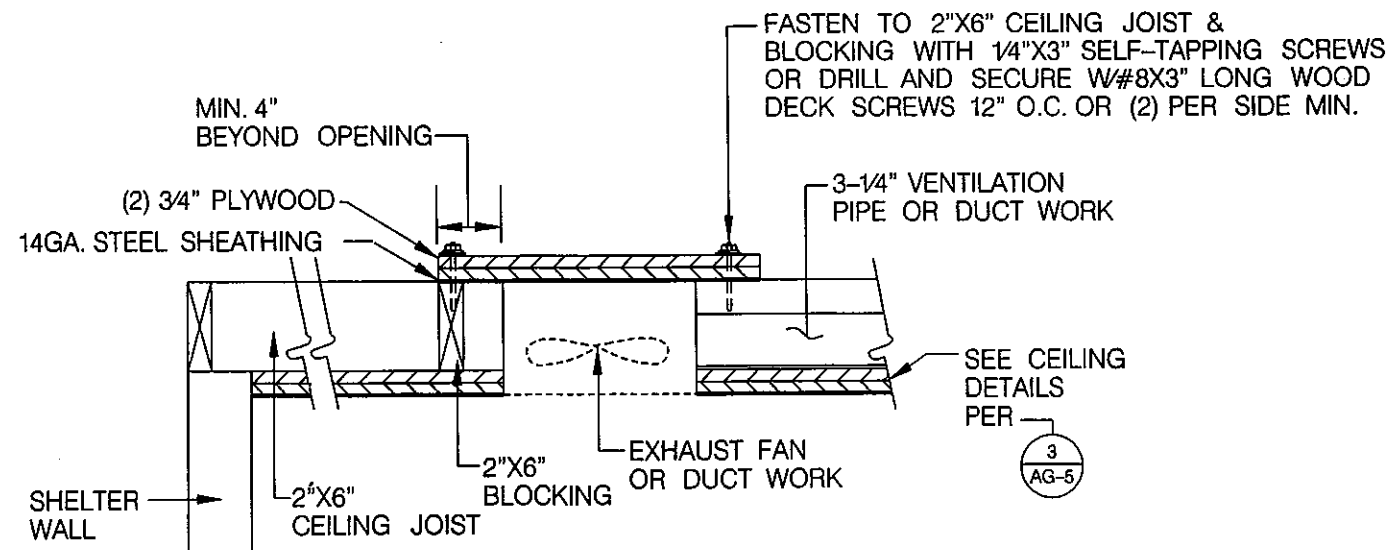


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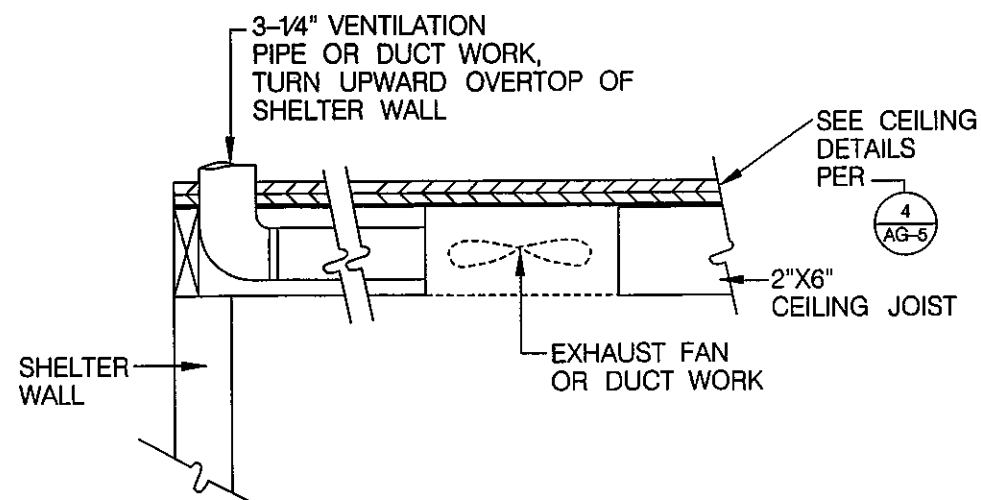


ALTERNATIVE 1 OF 2

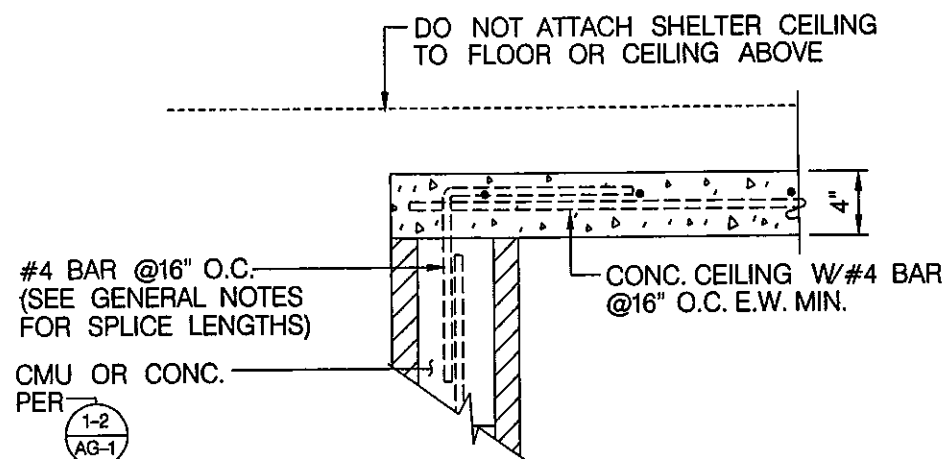
1 TYPICAL WALL / CEILING CONNECTION WOOD FRAMING USING EMBEDDED ANCHOR STRAP
SCALE: 1" = 1'-0"



3 CEILING EXHAUST FAN / HVAC DETAIL
SCALE: 1" = 1'-0"

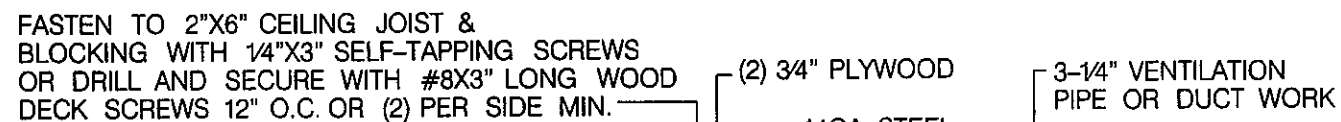


3A CEILING EXHAUST FAN / HVAC DETAIL
SCALE: 1" = 1'-0"



ALTERNATIVE 2 OF 2

2 TYPICAL WALL / CEILING CONNECTION FOR CONCRETE CEILING
SCALE: 1" = 1'-0"



3B CEILING EXHAUST FAN / HVAC DETAIL
SCALE: 1" = 1'-0"

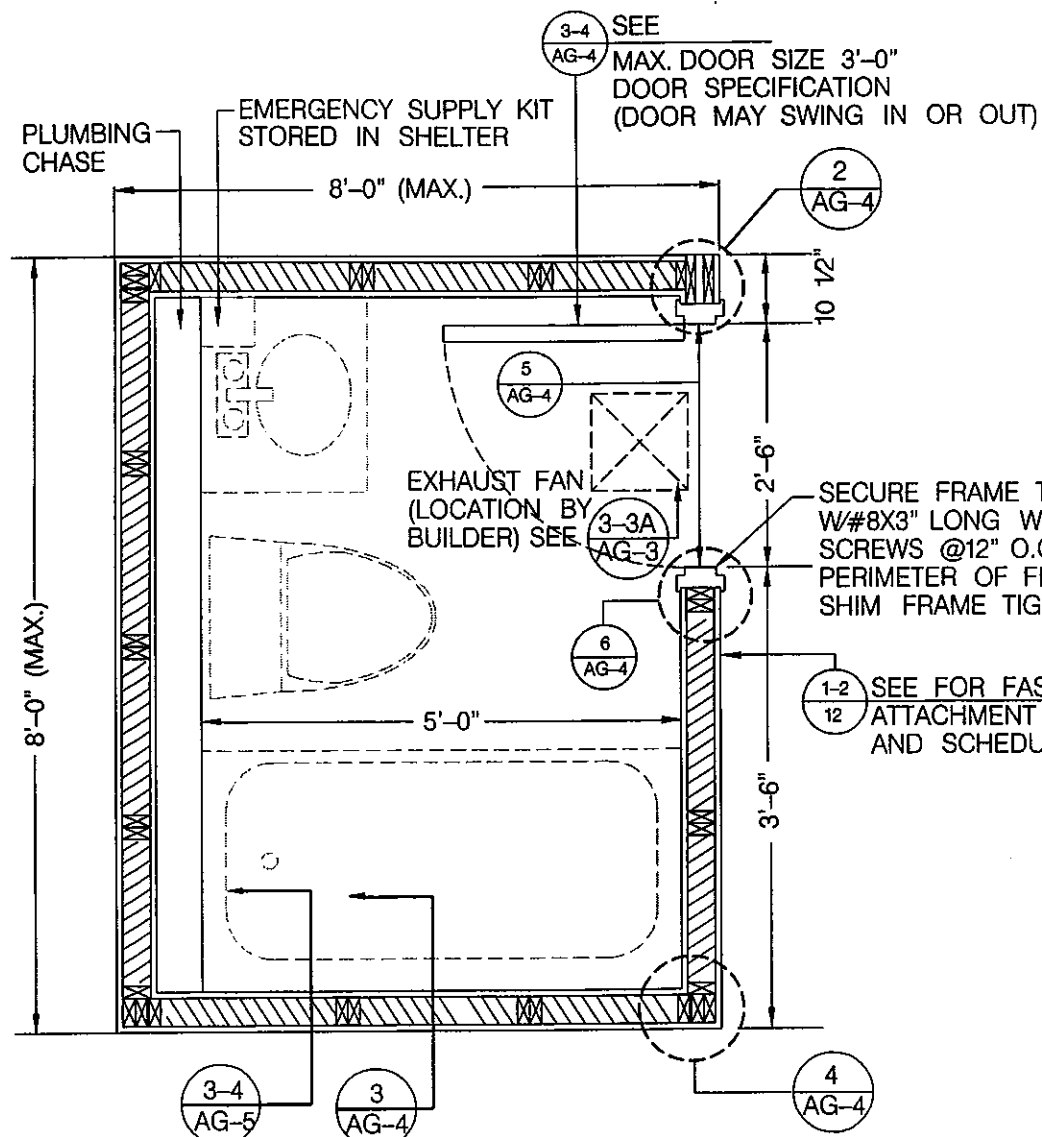
CMU/CONCRETE SECTIONS
CEILING ALTERNATIVES

DRAWING NO.: AG-3 SHEET 8 OF 14

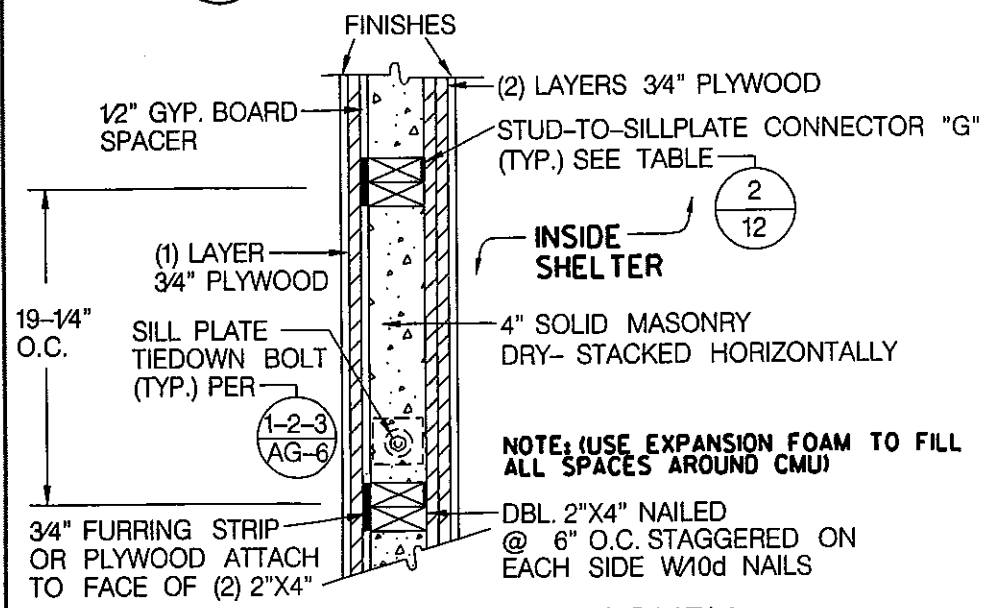
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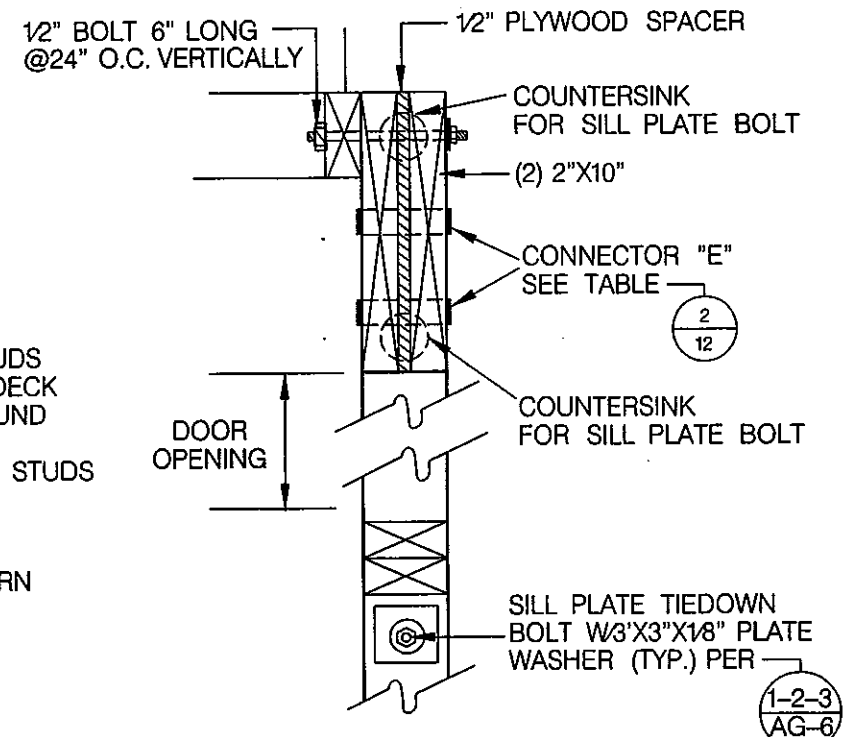
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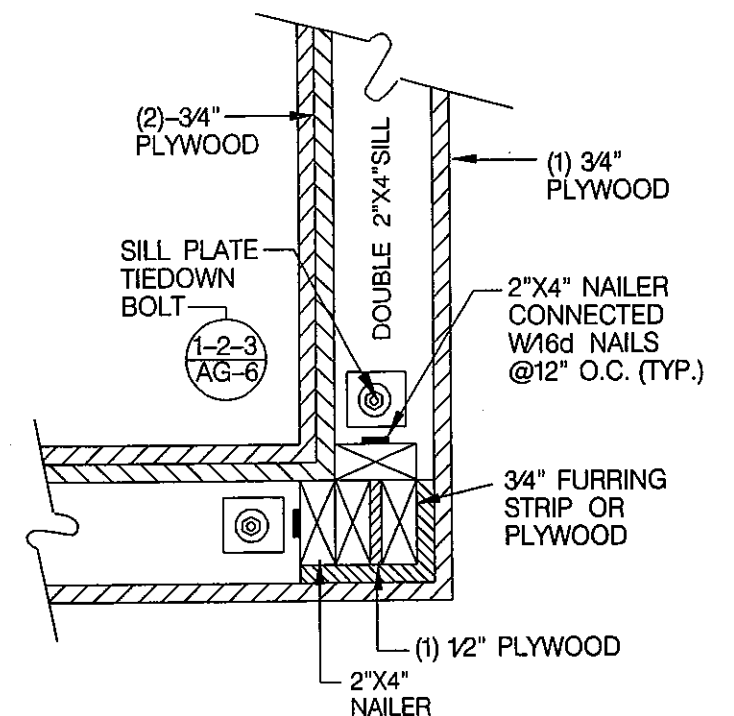
1 TYPICAL PLAN
 AG-4 SCALE: 1/2" = 1'-0"



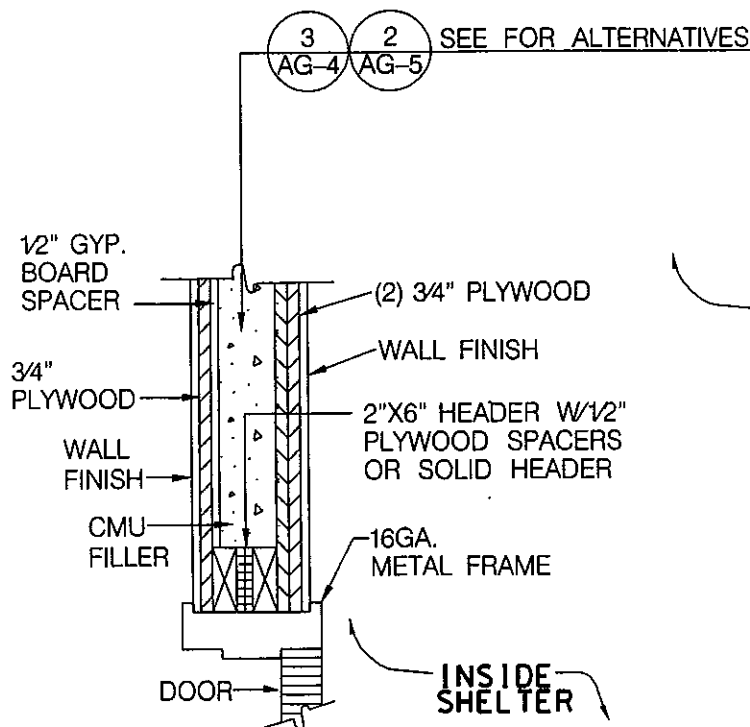
3 EXPANDED PLAN-MASONRY INFILL WALL ALTERNATIVE
 AG-4 TOP VIEW SCALE: 1" = 1'-0"



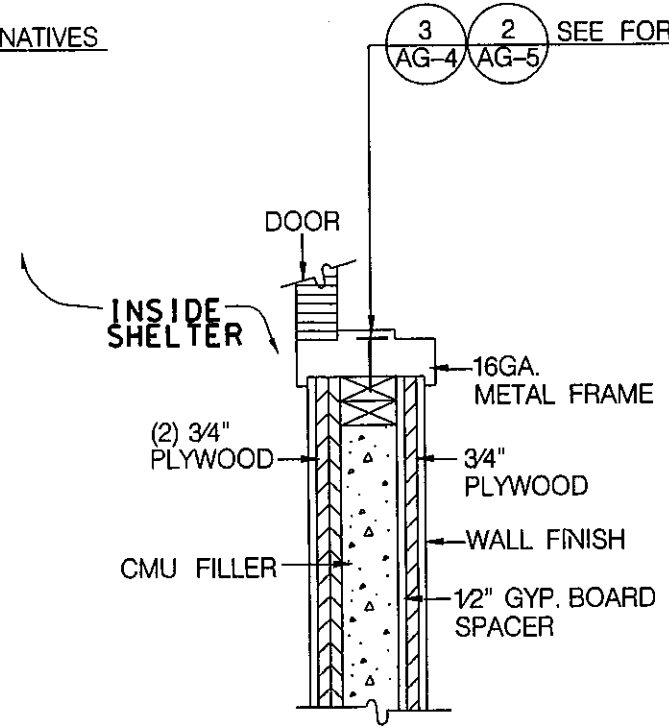
2 TYPICAL HOLD DOWN ANCHOR DETAIL AT DOOR CORNER
 AG-4 TOP VIEW SCALE: 1-1/2" = 1'-0"



4 TYPICAL WALL CORNER DETAIL
 AG-4 TOP VIEW SCALE: 1-1/2" = 1'-0"



5 DOOR HEAD SECTION
 AG-5 SCALE: 1" = 1'-0"



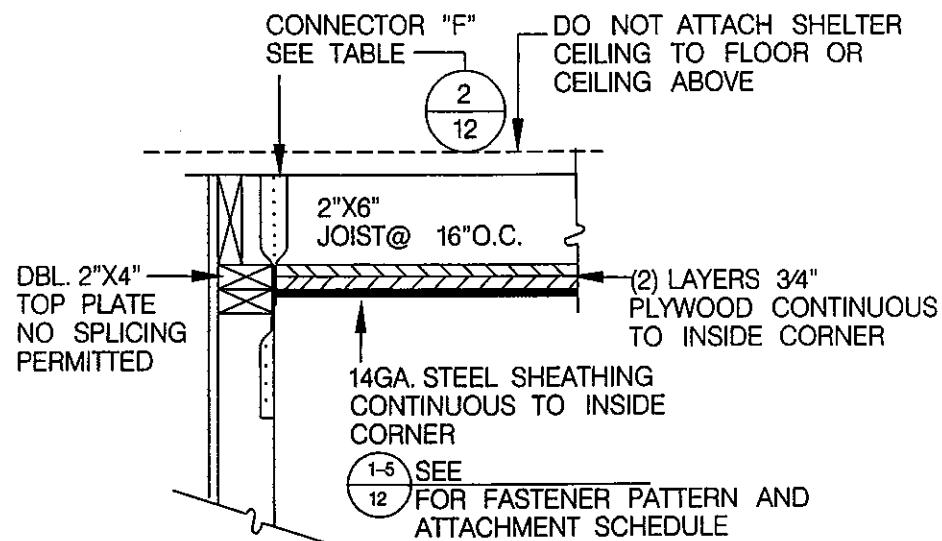
6 DOOR JAMB
 AG-5 TOP VIEW SCALE: 1" = 1'-0"

NOTE:
 ALL WALL STUDS TO BE ATTACHED W/ (2) 16d NAILS TO SINGLE TOP AND BOTTOM PLATES, NAILED THROUGH FROM OUTSIDE, PRIOR TO ATTACHMENT OF SECOND TOP AND BOTTOM PLATES.

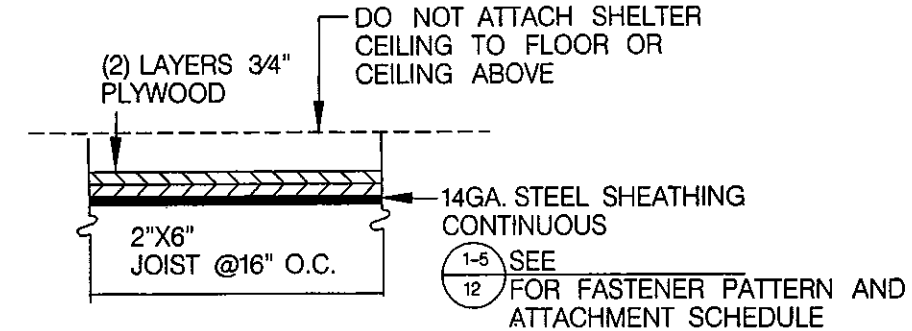
WOOD-FRAME SHELTER PLAN-PLYWOOD SHEATHING W/CMU INFILL

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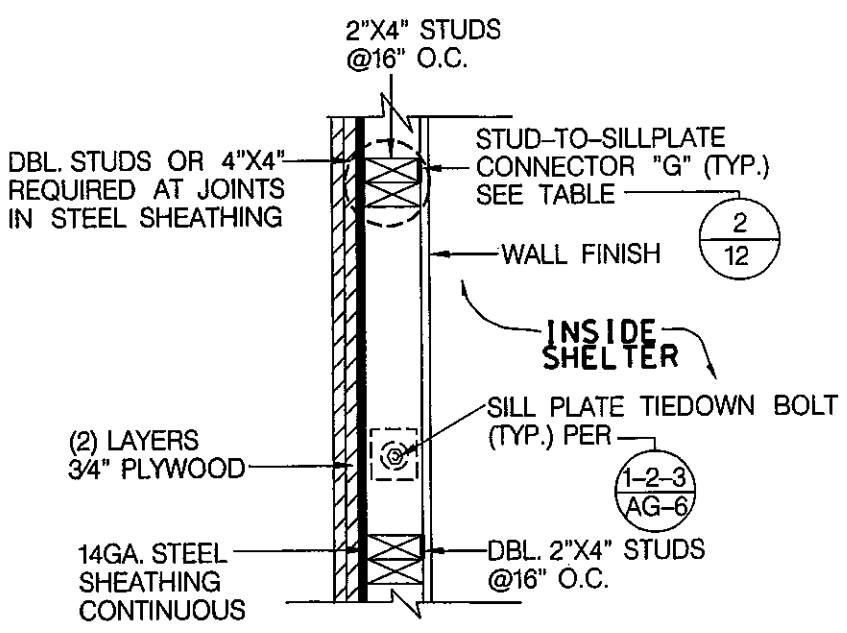




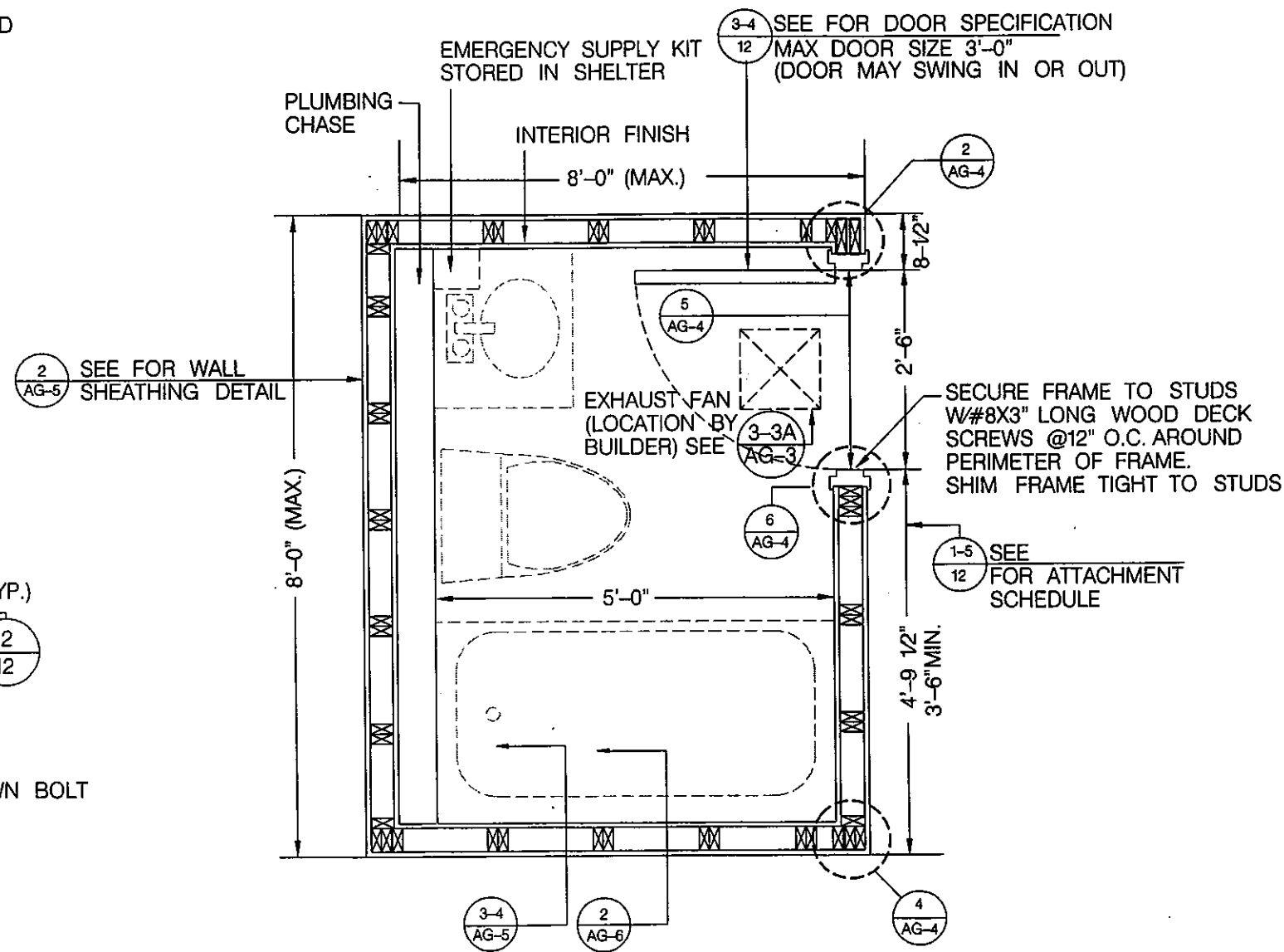
3 **ALTERNATIVE 1 CEILING PARTIAL-CEILING SECTION CONNECTION**
 AG-5 SCALE: 1" = 1'-0"



4 **ALTERNATIVE 2 CEILING**
 AG-5 SCALE: 1" = 1'-0"



2 **WALL SECTION**
 AG-5 TOP VIEW SCALE: 1" = 1'-0"



1 **TYPICAL PLAN VIEW**
 AG-5 SCALE: 12" = 1'-0"

NOTES:

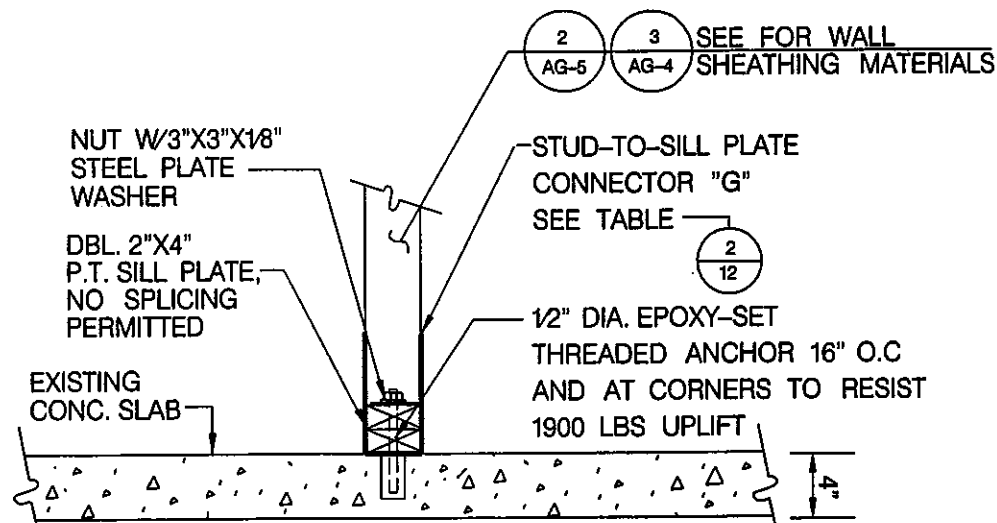
1. SHELTER W/ STEEL SHEATHING COVERED W/ GYP. BOARD FINISH OR OTHERWISE SEPARATED FROM CONTACT BY SHELTER OCCUPANTS NEED NOT BE GROUNDED.
2. SHELTER W/ STEEL SHEATHING UNCOVERED AND AVAILABLE FOR CONTACT BY SHELTER OCCUPANTS MUST BE GROUNDED AT A SINGLE LOCATION W/ COPPER WIRE & GROUND ROD TO MEET NATIONAL ELECTRIC CODE & LOCAL REQUIREMENTS.
3. ALL WALL STUDS TO BE ATTACHED W/ (2) 16d NAILS TO SINGLE TOP AND BOTTOM PLATES, NAILED THROUGH FROM OUTSIDE, PRIOR TO ATTACHMENT OF SECOND TOP AND BOTTOM PLATES.

WOOD FRAME SHELTER PLAN-
 PLYWOOD AND STEEL WALL
 SHEATHING

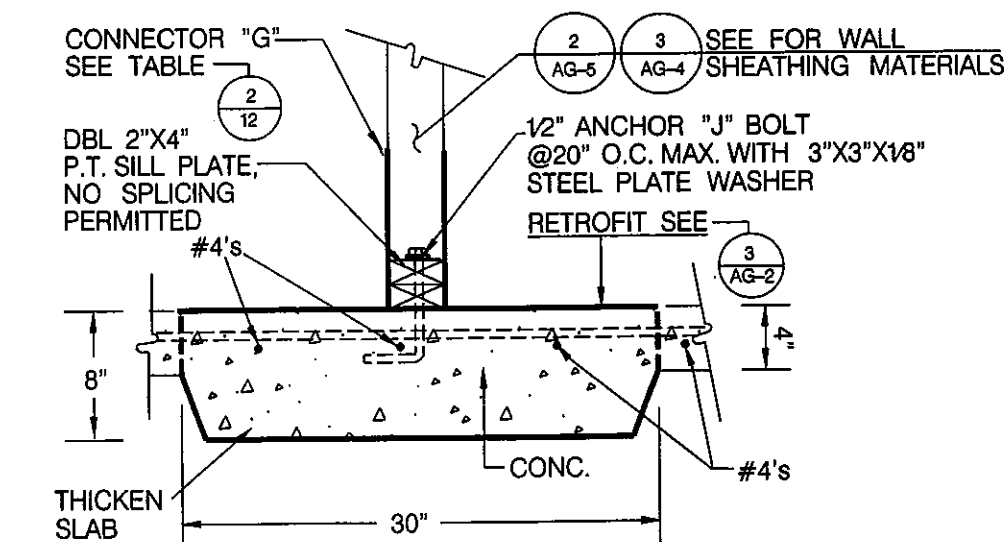
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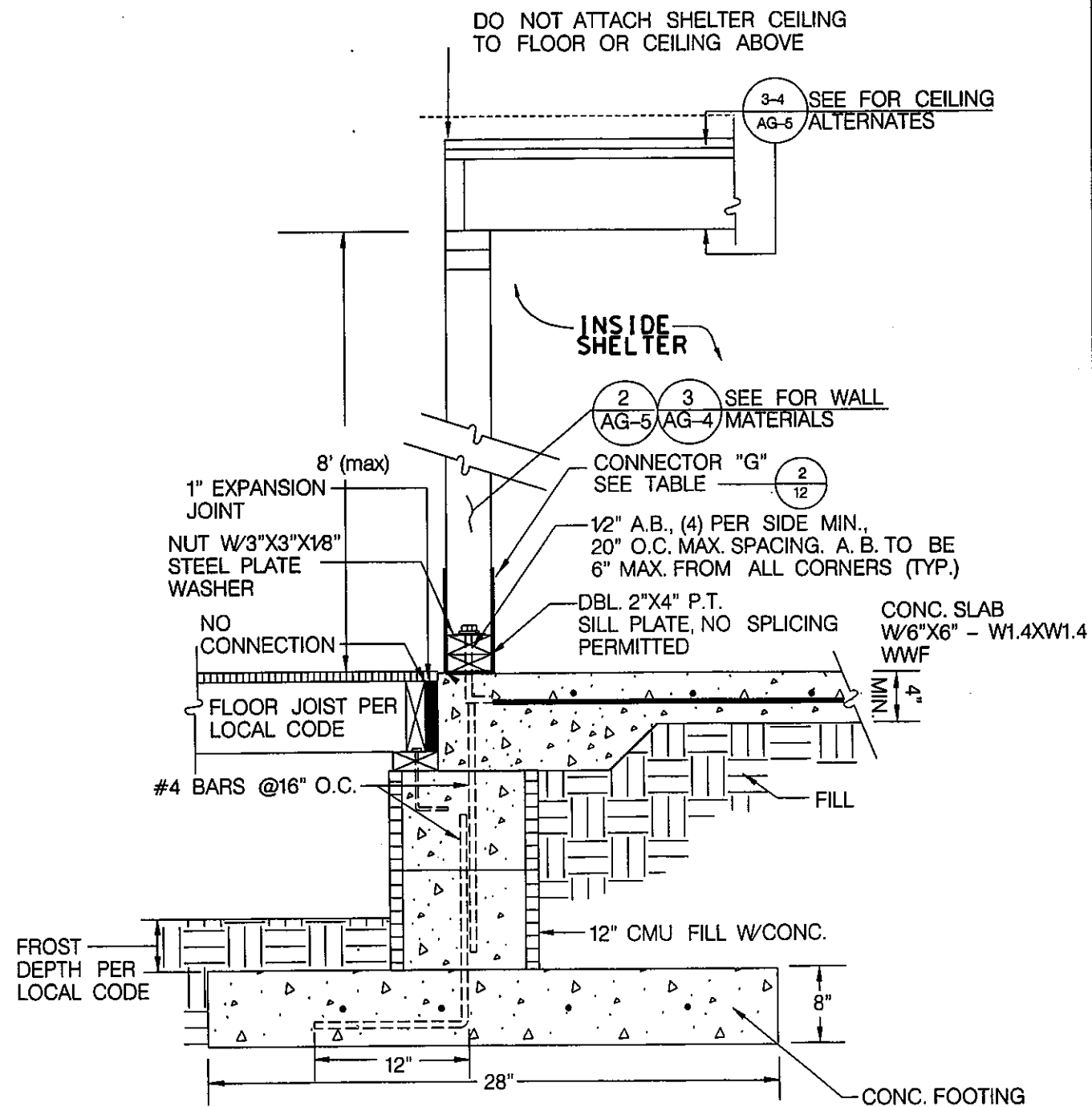




ALTERNATIVE 1 OF 2
1 TYPICAL HOLD DOWN ANCHOR DETAIL
AG-6 FOR WOOD WALLS
 SCALE: 1" = 1'-0"



ALTERNATIVE 2 OF 2
2 TYPICAL ANCHOR DETAIL NEW SLAB-ON-GRADE
AG-6 FOUNDATION WITH WOOD WALLS
 SCALE: 1" = 1'-0"



3 ANCHOR DETAIL FOR CRAWL SPACE
AG-6 FOUNDATION WITH WOOD WALLS
 SCALE: 1" = 1'-0"

NOTES:

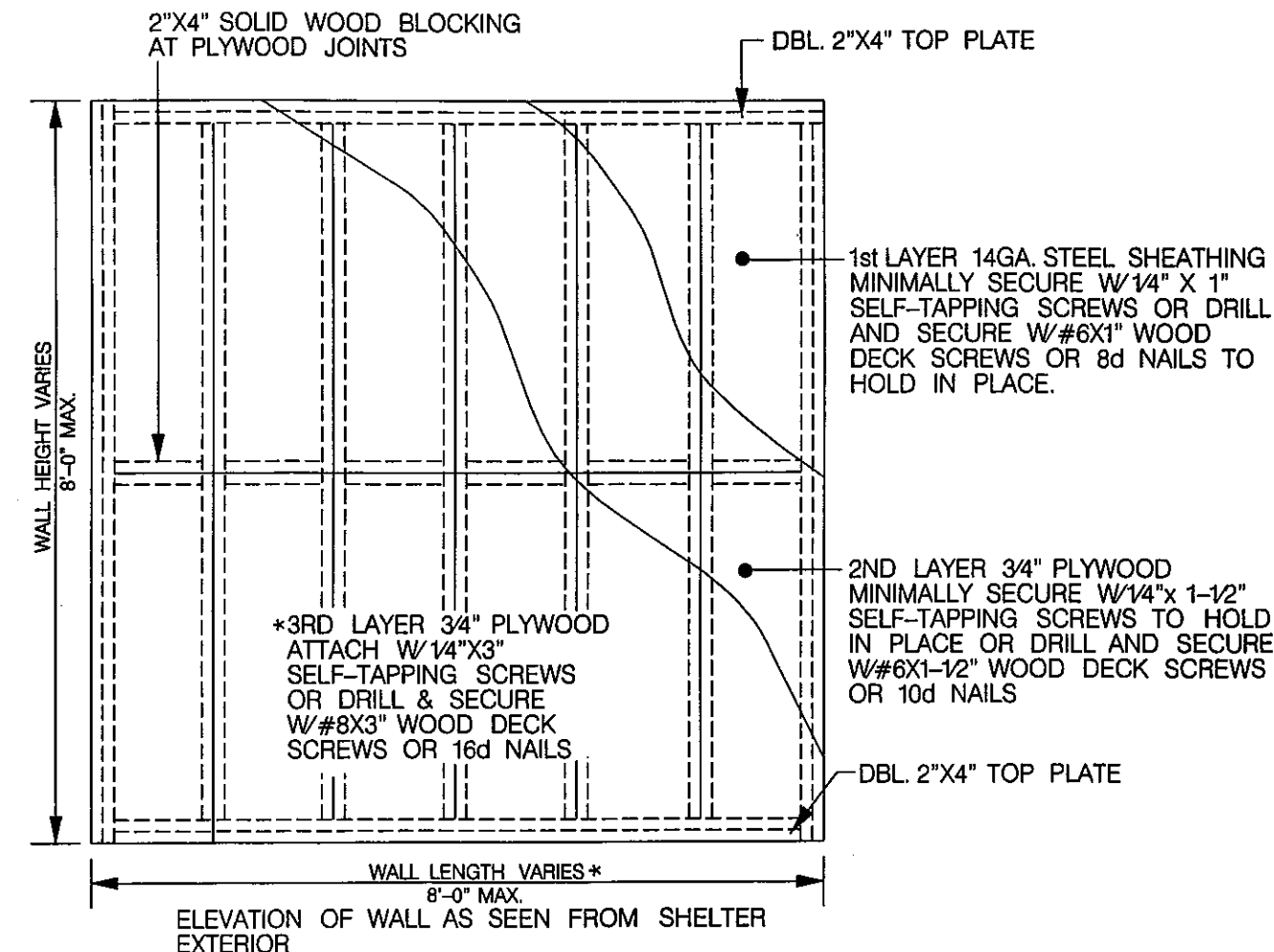
1. TO OBTAIN FULL A.B. PULLOUT RESISTANCE, THE BOTTOM OF THE DRILLED HOLE FOR A.B. SHOULD BE NO CLOSER THAN 1/2" TO THE BOTTOM OF THE CONC. SLAB.
2. A PILOT HOLE SHOULD BE DRILLED TO DETERMINE THE MAX. EMBEDMENT LENGTH.

**WOOD-FRAME SHELTER -
 FOUNDATION SECTIONS**

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1 PLYWOOD SHEATHING ATTACHMENT PATTERN

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

- *ATTACHMENT SCHEDULE VARIES BASED ON WALL LENGTH SEE TABLE FOR ATTACHMENT SCHEDULE
- INSTALL PLYWOOD HORIZONTALLY
- MINIMUM UNBROKEN WALL LENGTH IS 3'-6"

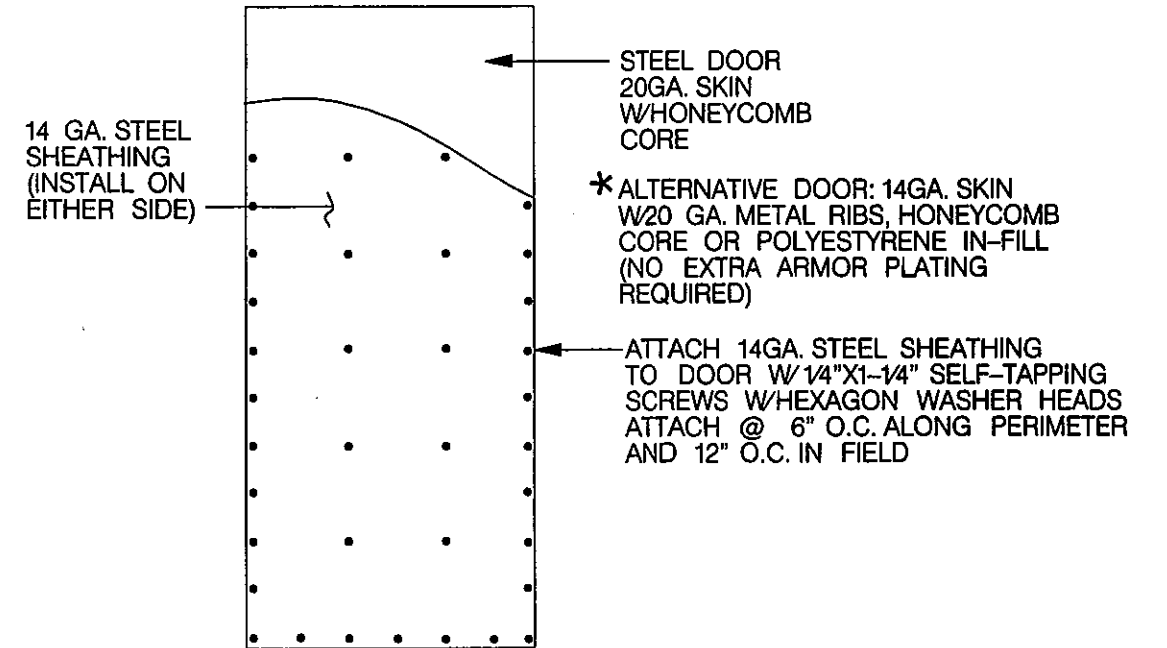
2 CONNECTOR SCHEDULE

LOCATION	SIMPSON STRONG-TIE	SEMCO	KANT-SAG
A	H7	RTPGA814	RT20
B	LSTA15	RTP20812	LSTA15
C	H6	TPP4	SP2
D	PAHD42	RTP42	PAHD42
E	SP4	TPP4	SP2
F	H6	TPP4	SP2
G	H6	TPP4	SP2
H	PAI18	--	PA18

NOTES: BECAUSE NOT ALL CONTRACTORS ARE FAMILIAR WITH THE TYPE OF STRUCTURAL CONNECTORS SHOWN IN THESE DRAWINGS, THE NAMES OF SOME COMPANIES THAT MANUFACTURE CONNECTORS HAVE BEEN INCLUDED IN THIS TABLE. THE LIST OF COMPANIES IS NOT, HOWEVER, EXHAUSTIVE. ADDITIONALLY, THIS LIST IS NOT INTENDED TO EXPRESS A PREFERENCE FOR THOSE MANUFACTURERS AND/OR THEIR PRODUCTS BY THE UNITED STATES GOVERNMENT NOR IS IT AN ENDORSEMENT OF THOSE MANUFACTURERS AND/OR THEIR PRODUCTS.

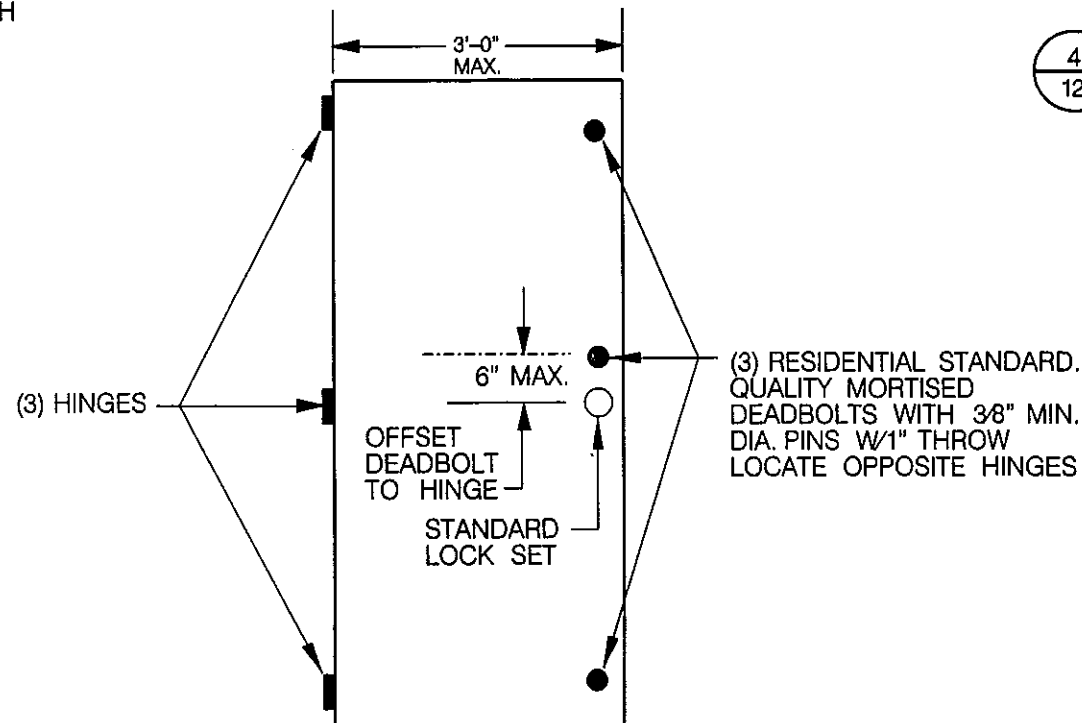
WALL LENGTH	16d NAILS	#8X3" WOOD DECK SCREWS	1/4" X 3" SELF TAPPING SCREWS
3'-6" TO 5'-0"	2" O.C. @ EDGES 6" O.C. IN FIELD	2" O.C. @ EDGES 6" O.C. IN FIELD	3" O.C. @ EDGES 6" O.C. IN FIELD
5'-1" TO 7'-0"	3" O.C. @ EDGES 6" O.C. IN FIELD	3" O.C. @ EDGES 6" O.C. IN FIELD	4" O.C. @ EDGES 6" O.C. IN FIELD
7'-1" TO 8'-0"	4" O.C. @ EDGES 6" O.C. IN FIELD	4" O.C. @ EDGES 6" O.C. IN FIELD	6" O.C. @ EDGES 6" O.C. IN FIELD

5 ATTACHMENT SCHEDULE



4 DOOR - SHEET METAL ATTACHMENT PATTERN

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



3 DOOR ATTACHMENT DETAILS

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

MISC. DETAILS

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MITIGATION DIRECTORATE WASHINGTON, DC

SHELTER: LEAN-TO

WALL MATERIALS

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
SYP. LUMBER	2" X 4" X 8'	EACH	26	
SYP. LUMBER	2" X 4" X 12'	EACH	2	
P.T. LUMBER	2" X 4" X 8'	EACH	4	
P.T. LUMBER	2" X 6" X 8'	EACH	1	
SYP. LUMBER	2" X 8" X 8'	EACH	1	
SYP. LUMBER	2" X 6" X 12'	EACH	9	
PLYWOOD	3/4"	4' X 8' SHEET	11	
STEEL SHEATHING	14 GA.	4' X 8' SHEET	7	

HARDWARE

MATERIAL	DIAMETER	LENGTH	MEASURE	QUANTITY	REMARKS
DOOR			EACH	1	MADE ON SITE
HINGES		MIN. 3/12" LONG	EACH	3	SEE ITEM 3 ON PAGE 12
SLIDE BOLTS/ DEAD BOLTS			EACH	3	SEE ITEM 3 ON PAGE 12
ANCHOR BOLTS	1/2"	MIN. 2-1/8" EMBED.	EACH	20	SEE ITEM 4 ON PAGE B-1
TYPE "A" CONNECTORS			EACH	9	SEE ITEM 2 ON PAGE 12
TYPE "B" CONNECTORS			EACH	9	SEE ITEM 2 ON PAGE 12
LAG BOLTS	1/2"		EACH	4	
16D NAILS			LB	10	

SHELTER: CMU WALL ON SLAB-ON-GRADE

WALLS

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
HOLLOW CMU	8" X 8" X 16"	EACH	240	W/ CONCRETE GROUT
REINFORCING BAR	#4	LINEAR FEET	368	
MORTAR MIX	80 LB	BAG	10	

SLAB-ON-GRADE FOUNDATION

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
REINFORCING BAR	#4 X 3'	EACH	19	BENT 2' X 1'
REINFORCING BAR	#4 X 8"	LINEAR FEET	100	
CONCRETE		CUBIC YARDS	2	

ALTERNATIVE (1) REINFORCED CONCRETE CEILING

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
REINFORCING BAR	#4 X 4'	EACH	19	BENT 2' X 2'
REINFORCING BAR	#4 X 8'	LINEAR FEET	14	
CONCRETE		CUBIC YARDS	1	

ALTERNATIVE (2) WOOD-FRAME CEILING

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
SYP. LUMBER	2" X 6" X 8'	EACH	10	
PLYWOOD	3/4"	4' X 8' SHEET	4	
STEEL SHEATHING	14 GA.	4' X 8' SHEET	2	

HARDWARE

MATERIAL	MEASURE	QUANTITY	REMARKS
DEADBOLTS	EACH	3	SEE ITEM 3 ON PAGE 12
DOORFRAME	EACH	1	SEE ITEM 1 ON PAGE AG-1
DOOR	EACH	1	SEE ITEMS 3 AND 4 ON PAGE 12
TYPE "D" CONNECTOR*	EACH	20	SEE ITEM 2 ON PAGE 12

* REQUIRED ONLY FOR ALTERNATIVE (2) WOOD-FRAME CEILING

CHASE WALL

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
P.T. LUMBER	2" X 6" X 8'	EACH	1	
SYP. LUMBER	2" X 6" X 8'	EACH	10	

SHELTER: CONCRETE WALL ON SLAB-ON-GRADE

WALLS

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
CONCRETE		CUBIC YARD	5	
REINFORCING BAR	#4	LINEAR FEET	520	

SLAB-ON-GRADE FOUNDATION

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
REINFORCING BAR	#4 X 3'	EACH	19	BENT 2' X 1'
REINFORCING BAR	#4 X 8"	LINEAR FEET	100	
CONCRETE		CUBIC YARD	2	

ALTERNATIVE (1) REINFORCED CONCRETE CEILING

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
REINFORCING BAR	#4 X 4'	EACH	19	BENT 2' X 2'
REINFORCING BAR	#4 X 8'	LINEAR FEET	14	
CONCRETE		CUBIC YARD	1	

ALTERNATIVE (2) WOOD-FRAME CEILING

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
SYP. LUMBER	2" X 6" X 8'	EACH	10	
PLYWOOD	3/4"	4' X 8' SHEET	4	
STEEL SHEATHING	14 GA.	4' X 8' SHEET	2	

HARDWARE

MATERIAL	MEASURE	QUANTITY	REMARKS
DEADBOLTS	EACH	3	SEE ITEM 3 ON PAGE 12
DOORFRAME	EACH	1	SEE ITEM 1 ON PAGE AG-1
DOOR	EACH	1	SEE ITEMS 3 AND 4 ON PAGE 12
TYPE "D" CONNECTOR*	EACH	20	SEE ITEM 2 ON PAGE 12

* REQUIRED ONLY FOR ALTERNATIVE (2) WOOD-FRAME CEILING

CHASE WALL

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
P.T. LUMBER	2" X 6" X 8'	EACH	1	
SYP. LUMBER	2" X 6" X 8'	EACH	10	

MATERIALS LISTS

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SHELTER: WOOD-FRAME WITH CMU INFILL
WALL ON SLAB-ON-GRADE

WALLS

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
SYP. LUMBER	2" X 4" X 8'	EACH	38	
P.T. LUMBER	2" X 4" X 8'	EACH	4	
SYP. LUMBER	2" X 6" X 8'	EACH	1	
PLYWOOD	3/4"	4' X 8' SHEET	24	
SOLID BLOCK	4" X 8" X 16"	EACH	128	DRY - STACK
SYP. LUMBER	2" X 8" X 10"	EACH	2	
SYP. LUMBER	1" X 4" X 8'	EACH	19	

CEILING

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
SYP. LUMBER	2" X 6" X 8'	EACH	10	
PLYWOOD	3/4"	4' X 8' SHEET	4	
STEEL SHEATHING	14 GA.	4' X 8' SHEET	2	

HARDWARE

MATERIAL	DIAMETER	LENGTH	MEASURE	QUANTITY	REMARKS
DOOR FRAME			EACH	1	SEE ITEMS 5 AND 6 ON PAGE 12
DOOR			EACH	1	SEE ITEMS 3 AND 4 ON PAGE 12
ANCHOR BOLTS	1/2"	MIN. 2-1/8" EMBED.	EACH	25	
TYPE "E" CONNECTORS			EACH	2	SEE ITEM 2 ON PAGE 12
TYPE "F" CONNECTORS			EACH	14	SEE ITEM 2 ON PAGE 12
TYPE "G" CONNECTORS			EACH	14	SEE ITEM 2 ON PAGE 12
DEADBOLTS			EACH	3	SEE ITEM 3 ON PAGE 12
16D NAILS			LB	20	

CHASE WALL

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
P.T. LUMBER	2" X 6" X 8'	EACH	1	
SYP. LUMBER	2" X 6" X 8'	EACH	10	

SHELTER: WOOD-FRAME WITH PLYWOOD AND STEEL SHEATHING
WALL ON SLAB-ON-GRADE

WALLS

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
SYP. LUMBER	2" X 4" X 8'	EACH	58	
P.T. LUMBER	2" X 4" X 8'	EACH	4	
PLYWOOD	3/4"	4' X 8' SHEET	16	
STEEL SHEATHING	14 GA.	4' X 8' SHEET	8	
SYP. LUMBER	2" X 10" X 8'	EACH	2	
SYP. LUMBER	2" X 6" X 8'	EACH	1	

CEILING

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
SYP. LUMBER	2" X 6" X 8'	EACH	10	
PLYWOOD	3/4"	4' X 8' SHEET	4	
STEEL SHEATHING	14 GA.	4' X 8' SHEET	2	

HARDWARE

MATERIAL	DIAMETER	LENGTH	MEASURE	QUANTITY	REMARKS
DOOR FRAME			EACH	1	SEE ITEMS 5 AND 6 ON PAGE 12
DOOR			EACH	1	SEE ITEMS 3 AND 4 ON PAGE 12
ANCHOR BOLTS	1/2"	MIN. 2-1/8" EMBED.	EACH	25	
TYPE "E" CONNECTORS			EACH	2	SEE ITEM 2 ON PAGE 12
TYPE "F" CONNECTORS			EACH	14	SEE ITEM 2 ON PAGE 12
TYPE "G" CONNECTORS			EACH	14	SEE ITEM 2 ON PAGE 12
DEADBOLTS			EACH	3	SEE ITEM 3 ON PAGE 12
16D NAILS			LB.	20	

CHASE WALL

MATERIAL	SIZE	MEASURE	QUANTITY	REMARKS
P.T. LUMBER	2" X 6" X 8'	EACH	1	
SYP. LUMBER	2" X 6" X 8'	EACH	10	

MATERIALS LISTS

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